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Purpose: The ALSA Center publishes the *ALSB* three times a year. ALSA is a multi-Service DOD field agency sponsored by the US Army Training and Doctrine Command (TRADOC), Marine Corps Combat Development Command (MCCDC), Navy Warfare Development Command (NWDC), and Curtis E. LeMay Center for Doctrine Development and Education (LeMay Center). This periodical is governed by Army Regulation 25-30, Chapter 10. The ALSB is a vehicle to "spread the word" on recent developments in warfighting concepts, issues, and Service interoperability. The intent is to provide a cross-Service flow of information among readers around the globe.

Disclaimer: Since the ALSB is an open forum, the articles, letters, and opinions expressed or implied herein should not be construed as the official position of TRADOC, MCCDC, NWDC, Lemay Center, or ALSA Center.

Submissions: We solicit articles and reader's comments. Contributions of 1,500 words or less are ideal. Submit contributions, double-spaced in MS Word. Include the author's name, title, complete unit address, telephone number, and email address. Graphics can appear in an article, but a **separate computer file for each graphic and photograph (photos must be 300 dpi) must be provided**. Send email submissions to alsadirector@langley.af.mil. The ALSA Center reserves the right to edit content to meet space limitations and conform to the *ALSB* style and format.

Next issue: September 2012; Submission DEADLINE: COB 15 June 2012. The theme of this issue is "Attack the Network".

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Cover photo—US Army National Guard (ARNG) Soldiers plan and coordinate missions in the tactical operations center during exercise Palmetto Response in McCormick, SC, 11 June 2011. (Photo by SSgt Jonathan Lovelady, USAF.)

DIRECTOR'S COMMENTS

On behalf of the The Air Land Sea Application (ALSA) Center we recognize and thank Col Hume and his family for their distinguished military service and wish them good health and a life rich with blessings as they depart active duty and enter into retirement. Col Hume enjoyed a very successful 28-year Air Force career culminating in his assignment to ALSA where he was the director from July 2009 until April 2012.

ALSA accomplished some major milestones under Col Hume's leadership. These include the development of several new multi-Service tactics, techniques, and procedures (MTTP) which continue the long tradition of ALSA's charter to meet the immediate needs of the warfighter. Additionally, all of the ALSA MTTP were placed on the Joint Doctrine, Education and Training Electronic Information System (JDEIS), providing greater access and search capability for the user.

We produced the first digital-only Air Land Sea Application Bulletin (ALSB) in January 2012. We continue to provide the ALSB in PDF format (downloadable to e-readers), and now offer the option to view the ALSB online in Flash (SWF) format. Our reader feedback indicates the new electronic version has been well received.

We intend to continue producing the ALSB electronically. If you would like an electronic notification of release dates for ALSBs or MTTP publications (under revision), send your organizational, military, or personal email address to: alsa_alb@langley.af.mil.

We continue to refine the ALSA webpage. We have added short videos which describe what we do at ALSA and are leveraging social media outlets such as YouTube, Facebook and Twitter. We invite you to visit our webpage at http://www.alsa.mil and get linked in to what ALSA is accomplishing for the warfighter.

The theme of this month's ALSB is Airspace Control. The intent is to highlight discrepencies existing in the battlespace. As many found in Iraq and Afghanistan, command and control integration is very complex and has proven to be challenging; especially in regard to airspace coordination, deconfliction, and interpretation.

The first article, "Coordination Measures", was authored by an experienced trio of warfighters, Rich Roberts, Al Shafer, and Patrick Pope. It discusses identified coordination measures and proposed changes to them.

The second article, "Marine Air-Ground Task Force (MAGTF) Battlespace", written by Marine Corps Maj Jeremy Winters and Capt Amanda Donnely, offers a time and battle tested view of airspace control along with the authors' vision.

"The ASOC Past, Present, and Future", was written by Air Force Maj Alexander Heyman and offers insight into the immediate air request world.

Another trio of writers are retired colonels Curtis Neal and Robert Green, and retired lieutenant colonel Troy Caraway who wrote the fourth article, "Joint Air Ground Integration Cell". This article provides insight into the need for this concept.

The last article is, "Airspace Transitions from JFACC to Civilian ATC Control". It was written by Air Force Maj Brian Mansfield and Capt James Capra. It is based on the continuance of airspace control after the military has moved on.

Finally, we are looking at our next ALSB, which will be published in September. The topic is "Attack the Network". If you have an article you would like us to consider publishing, email it to alsab@langley.af.mil no later than 15 June.

As always, we value your feedback on our ALSB's new digital format as well as on our MTTP. Let us know how we are doing!

BRUCE V. SONES, Colonel, USA

Director

COORDINATION MEASURES

US Air Force E-3B Sentry Airborne Warning And Control System surveillance technicians from the 965th Expeditionary Air Control Squadron track simulated hostile aircraft during a multi-national exercise, 9 November 2008. (Photo by MSGT Denise Johnson, USAF).

By
Rich "R2" Roberts, Al "Shäf" Shafer, and Patrick "p2" Pope

We thought ACMs protected aircraft orbiting in a restricted operating zone (ROZ) from other aircraft and fires…

Many have heard of, and used, airspace coordinating measures (ACMs) and fire support coordination measures (FSCMs). Until a few years ago, as a graybeard combat airspace, air operations center (AOC) guy and former AOC formal training unit instructor (R2), and multi-tour air liaison officer (ALO) and former combat air operations center (CAOC) Chiefs of Combat Operations (p2 and Shaf), we thought ACMs restricted "things" from going through ACMs unless they were coordinated with a controlling agency. We thought ACMs protected aircraft orbiting in a restricted operating zone (ROZ) from other aircraft and fires (i.e., artillery, Guided Multiple Launch Rocket System (GLMRS), Multiple Launch Rocket System (MLRS) etc.). We were wrong!

As we became smart on this issue, we found there were over 160 usages based on joint and North Atlantic Treaty Organization doctrine as well as a proposed airspace tool called joint airspace management and deconfliction (JASMAD), now known as airspace management application. With the help of subject matter experts (SMEs) at Langley Air Force Base, Fort Leavenworth, KS, and Fort Sill, OK, we determined FSCMs listed in Joint Pub (JP) 3-09, Joint Fires, were also listed as ACM usages (not FSCMs) in United States Message Text Format (USMTF) and in JP 3-52, Joint Airspace Control.

So, "Houston, we have a problem." This is a problem with conflicting Joint pubs and a plethora of ACM usages. To help solve this issue, we

briefed the Army Air Force Integration Forum (AAFIF), identifying the need to deconflict ACMs and FSCMs in the Joint pubs and to research the ops requirement for the 160 plus ACM usages listed. In May 2010, Joint Forces Command (JFCOM) Joint Staff (J8), Deputy Director, C4 Joint Fires Division (formerly Joint Fires Branch, J85) offered to work the issue from a joint perspective; AAFIF agreed that the Joint Fires Support (JFS) Executive Steering Committee (ESC) is the right forum to gather the multiple SMEs to work the issue.

The JFS ESC hosted two Defense Communications Online (DCO) meetings with joint fires, airspace, command and control (C2), and operations SMEs explaining the issues and hosted a working group at the Combat Airspace Conference (CAC) in June 2010.

At the CAC, JFCOM hosted a working group led by Herb Foret and Al Shafer. Working group participants included the same disciplines as the DCOs plus coalition partners. Shafer briefed the DCO vetted draft list of simplified coordination measures (CMs) which included ACMs; FSCMs; and new categories called maritime measures, air defense measures, air traffic control, air reference measures, and maneuver measures.

The CAC working group agreed with reducing the amount of ACM usages and with the concept of new coordination measure categories. Everyone agreed standardization and simplification of CMs was prudent to help the airspace C2 warrior. Following the 2010 CAC, JFCOM hosted four DCO meetings with the same SME discipline representatives working the issues. The SMEs agreed to a new, smaller, standardized list of five ACMs (i.e., ROZ, air corridors (AIRCORS), coordination altitude (CDALT), NOFLY, high density airspace control zone (HIDACZ)) which all airspace and fires systems will recognize. Also, ACMs will restrict all airspace users from flying/shooting through the ACM unless they properly coordinate to use that airspace. Thus, an ACM will protect an aircraft orbiting or using an ACM from other friendly airspace users, including fires. This supports the airspace tenant of minimizing fratricide. The new ACM concept also does not restrict combat operations (another basic tenant of airspace control), permitting airspace users to transit/shoot through an ACM, if they coordinate.

The first "spiral" of improvements in coordination measures came from the JFS ESC 06. In Dec 2010, the Airspace Sub-Working Group (established by the JFS ESC) submitted a revised Spiral 1 list of CMs (page 6) streamlining and categorizing measures and usages. The Spiral 1 CM list reduces 168 usages of coordination, control, and other measures to 97, and puts them into seven categories. The spiral approach was chosen to permit service program managers and doctrine centers to begin refining and focusing improvements in C2 systems and tactics, techniques, and procedures. Subsequent spirals will further refine CMs that weren't resolved in the first. Specifically, further work is needed on air and maritime defense measures. Additionally, the JFS ESC has agreed to continue efforts to update and reconcile joint publications to reflect these changes.

Related to this streamlining is ALSA's effort to consolidate several airspace-related, multi-Service tactics, techniques and procedures (MTTPs) into a single document. Directed by its Joint Actions Steering Committee, in January 2012 ALSA began the process of researching and developing an Airspace Control and Fires Integration (ACFI) MTTP which is expected to enhance the airspace planner, executor, and C2 community as a "one-stop" TTP vice the current proliferation of TTPs and doctrine. There are possible changes to JP 3-52 and JP 3-09, which, together with the new ACFI MTTP, will help the airspace C2 community shift from a deconfliction to an integration mindset.

Everyone agreed standardization and simplification of CMs was prudent to help the airspace C2 warrior.

Airspace Coordinating Measures		Fire Support Coordination Measures	Maneuver Control Measures	Air Reference Measures	Air Defense Measures	Maritime Defense Measures	Air Traffic Control Measures
(ACM)		(FSCM)	(MCM)	(ARM)	(ADM)	(MDM)	(ATCM)
Measures	Usages						
AIRCOR		ACA	AO*	ACP	ADIZ	ADZ	ADVRTE
	MRR	CFL	AOA	ACS*	BDZ	APPCOR	ARWY
	TMRR	FSCL	AOR*	BZ	CONTZN	CCZONE	ALERTA
	TC	FFA	BNDRY	BULL	CADA	COZ	ALTREV
	TR	KILLBX	FLOT	CP	HIMEZ	FIRUB	CLSA
	LLTR	NFA	FSA	CL	FEZ*	FRAD	CLSB
	SC	RFA	JOA	DP*	FWDZON	ISP	CLSC
	SAAFR	RFL	JSOA*	ERP*	JEZ	ISR	CLSD
ROZ		ZF	PL	IFFOFF	KILLZ	MFEZ	CLSE
	SSMS*			IFFON	LFEZ	MMEZ	CLSF
	SSM			PCP*	LMEZ	PIRAZ	CLSG
	UA			RP*	LOMEZ	RTF	CDR
	AAR			SARDOT	MISARC	SAFES	DA
	ABC				SL	SCZ	FIR
	AEW				SHORAD	SSMEZ*	MOA
	CAS				TL		PROHIB
	CAP				WFZ		RA
	DZ						WARN
	EC						TFRS*
	LZ						
	PZ						
	RECCE						
	SOF						
	HA						
	BP						
CRDALT							
NOFLY							
HIDACZ							

Note: * indicates a change to USMTF

Coordination Measures (Spiral 1)

Acronym	Measure/Usage
AAR	Air-to-Air Refueling Area (usage of ROZ)
ABC	Airborne Command and Control Area (usage of ROZ)
ACA	Airspace Coordination Area
ACM	Airspace Coordinating Measures
ACP	Air Control Point
ACS	Airspace Control Sector
ADIZ	Air Defense Identification Zone
ADM	Air Defense Measures
ADVRTE	Advisory Route
ADZ	Amphibious Defense Zone
AEW	Airborne Early Warning (usage of ROZ)
AIRCOR	Air Corridor
ALERTA	Alert Area
ALTREV	Altitude Reservations
AO	Area of Operations
AOA	Amphibious Objective Area
AOR	Area of Responsibility
APPCOR	Approach Corridor
ARM	Air Reference Measure
ARWY	Airway
ATCM	Air Traffic Control Means
BDZ	Base Defense Zone
BNDRY	Boundary
BP	Battle Position
BULL	Bullseye
BZ	Buffer Zone
CADA	Coordinated Air Defense Area
CAP	Combat Air Patrol (usage of ROZ)
CAS	Close Air Support (usage of ROZ)
CCZONE	Carrier Control Zone
CDR	Conditional Route
CFL	Coordinated Fire Line
CL	Coordination Level
CLSA	Class A Airspace
CLSB	Class B Airspace
CLSC	Class C Airspace
CLSD	Class D Airspace
CLSE	Class E Airspace
CLSF	Class F Airspace
CLSG	Class G Airspace
CONTZN	Control Zone
COZ	Crossover Zone
CP	Contact Point
CRDALT	Coordinating Altitude
DA	Danger Area
DP	Departure Point
DZ	Drop Zone (usage of ROZ)
EC	Electronic Combat (usage of ROZ)
ERP	En Route Point
FEZ	Fighter Engagement Zone
FFA	Free-Fire Area
FIR	Flight Information Region
FIRUB	Fire Umbrella
FLOT	Forward Line of Own Troops
FRAD	Falcon Radials
FSA	Fire Support Area
FSCL	Fire Support Coordination Line
FSCM	Fire Support Coordination Measures

Acronym	Measure/Usage
FWDZON	Forward Air Defense Zone
HA	Holding Area
HIDACZ	High Density Airspace Control Zone
HIMEZ	High-altitude Missile Engagement Zone
IFFON	IFF Switch On Line
ISP	Identification Safety Point
ISR	Identification Safety Range
JEZ	Joint Engagement Zone
JOA	Joint Operating Area
JSOA	Joint Special Operations Area
KILLBX	Killbox
KILLZ	Kill Zone
LFEZ	Land Fighter Engagement Zone
LLTR	Low Level Transit Route (usage of AIRCOR)
LMEZ	Land Missile Engagement Zone
LOMEZ	Low-altitude Missile Engagement Zone
LZ	Landing Zone (usage of ROZ)
MCM	Maneuver Control Measures
MDM	Maritime Defense Measures
MFEZ	Maritime Fighter Engagement Zone
MISARC	Missile Arc
MMEZ	Maritime Missile Engagement Zone
MOA	Military Operations Area
MRR	Minimum-Risk Route (usage of AIRCOR)
NFA	No-Fire Area
NOFLY	No Fly Area
PCP	Penetration Control Point
PIRAZ	Positive Identification and Radar Advisory Zone
PL	Phase Line
PROHIB	Prohibited Area
PZ	Pickup Zone (usage of ROZ)
RA	Restricted Area
RECCE	Reconnaissance Area (usage of ROZ)
RFA	Restrictive Fire Area
RFL	Restrictive Fire Line
ROZ	Restricted Operating Zone
RP	Rendezvous Point
RTF	Return To Force
SAAFR	Standard use Army Aircraft Flight Route (usage of AIRCOR)
SAFES	Safety Sectors
SARDOT	Search and Rescue Point
SC	Special Corridor (usage of AIRCOR)
SCZ	Ship Control Zone
SHORAD	Short-Range Air Defense engagement zone
SL	Safe Lane
SOA	Special Operations area (usage of ROZ)
SSM	Surface-to-Surface Munitions (usage of ROZ)
SSMEZ	Silent Surface-to-air Missile Engagement Zone
SSMS	Surface-to-Surface Missile Systems (usage of ROZ)
TC	Transit Corridor (usage of AIRCOR)
TFRS	Temporary Flight Restriction
TL	Transverse Level
TMRR	Temporary Minimum Risk Route (usage of AIRCOR)
TR	Transit Route (usage of AIRCOR)
UA	Unmanned Aircraft (usage of ROZ)
WARN	Warning Area
WFZ	Weapons Free Zone
ZF	Zone of Fire

Coordination Measures Acronyms

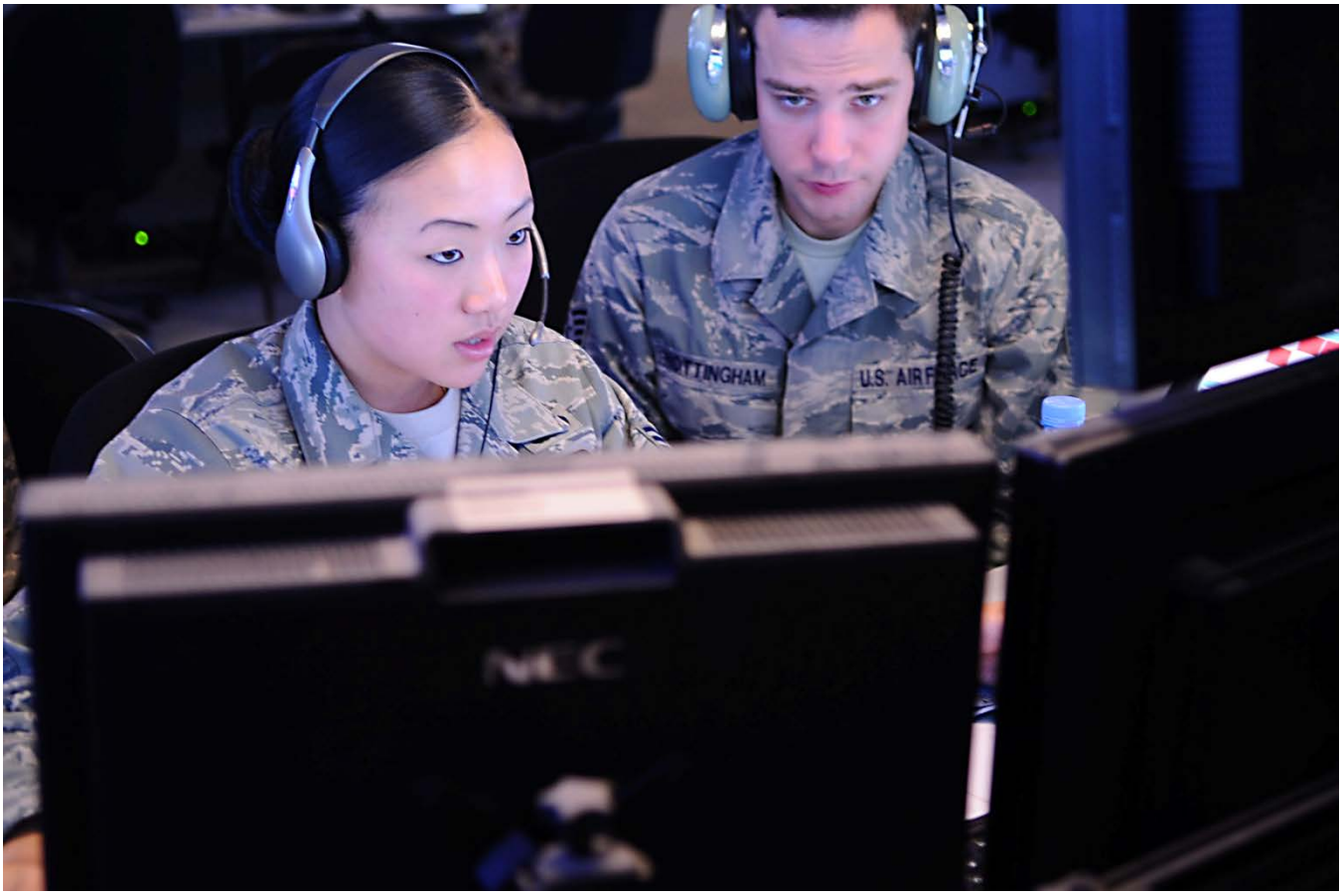
Airspace control has become a complex challenge for commanders and will become more complex in combat, non-combat, and civil-military operations. Improved precision munitions, new weapon systems, and the proliferation of unmanned aircraft systems have increased the effectiveness of fires while complicating the task of airspace control. The current plan-centric method of controlling airspace does not enable commanders to fully integrate all airspace users during ongoing operations in or near real time. While detailed planning will remain critical, airspace control will increasingly shift from plan- to execution-centric and from deconfliction- to integration-oriented.

Improved precision munitions, new weapon systems, and the proliferation of unmanned aircraft systems have increased the effectiveness of fires while complicating the task of airspace control.

Critical to improving airspace and fires integration is the joint interoperability of service-owned command, control, communications, and computer (C4) systems. Specifically, common language and terms are necessary within current data schemas to better enable machine-to-machine interfaces. Convergent evolution of service-owned C4 systems is a cost-effective way to decrease coordination time, increase operational tempo and combat effectiveness, improve integration, and lower fratricide risk.

Over the long term, the joint, service, agency, and partner nation communities must cooperate to facilitate the convergent evolution, functionality, and interoperability of current and future C2 and weapon systems to display near real time dynamic airspace changes in a joint airspace operating environment.

Note: Rich "R2" Roberts works for the Air Combat Command (A3AA, Airspace) at Langley Air Force Base, VA; Al "Shäf" Shafer, is employed at Headquarters, Department of the Air Force (A3O-BAA, Airspace) in the Pentagon; Patrick "p2" Pope, works for the JS J8 Joint Fires Division, Norfolk, VA.



Senior Airman Jennifer Anderson (left) and Staff Sgt. Zachary Nottingham, 71st Expeditionary Air Control Squadron weapons directors, communicate with downrange aircraft from a non-disclosed Southwest Asia location 13 January 2010. The weapons directors help provide troops on the ground with appropriate air support. (Photo by SrA Kasey Zickmund, USAF)

MARINE AIR-GROUND TASK FORCE BATTLESPACE

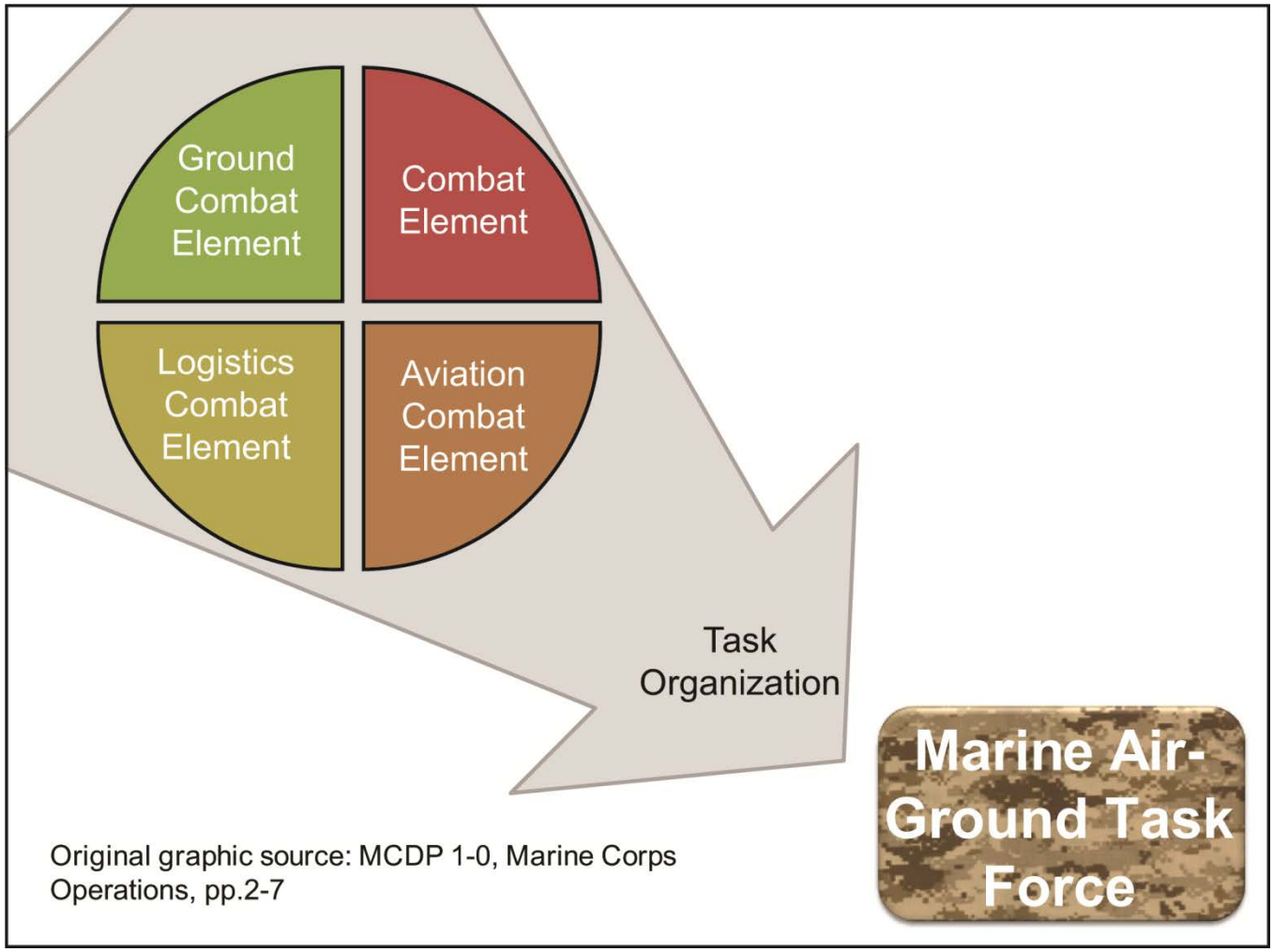
US Marines man the Tactical Air Operations Module (TAOM) at Site 50 near Welton, Ariz., 21 April 2011. The TAOM, which plans, directs, and controls tactical air operations, is part of the Tactical Air Operations Center. US Marines are taking part in Weapons and Tactics Instructor Course 2-11 hosted by Marine Aviation Weapons and Tactics Squadron (MAWTS) 1. (Photo by Cpl. Patrick P. Evenson, USMC)

By Maj Jeremy Winters, USMC and Capt Amanda Donnelly, USMC

The MAGTF is a microcosm of the Joint Force. Integrated under a command element (CE) with a single commander, the MAGTF is comprised of a land component (ground combat element (GCE)), an air component (aviation combat element (ACE)), and a special operations component Marine Special Operations Command (MARSOC), all supported by a logistics combat element (LCE). The MAGTF's requirement to perform as the expeditionary "force in readiness," supporting missions across the range of military operations and spectrum of conflict, demands the Marine Corps organizes, trains, and equips its MAGTFs to operate as independent entities and as integral members of a larger joint force. As such, the MAGTF must balance the seemingly incongruous requirements to remain an agile, light-infantry force against the need to conduct high-tempo, integrated fire and maneuver as a combined arms team.

The MAGTF is a microcosm of the Joint Force. Integrated under a command element (CE) with a single commander…

In contrast to the traditional Army/Air Force relationship where a largely mechanized infantry force possessing rotary wing maneuver elements and long-range fire support receives most of its air support from another Service, the MAGTF operates as a single, tightly integrated, air/ground/logistics team. Marines require three critical capabilities to achieve such a high level of integration. First is the MAGTF "single-battle concept";



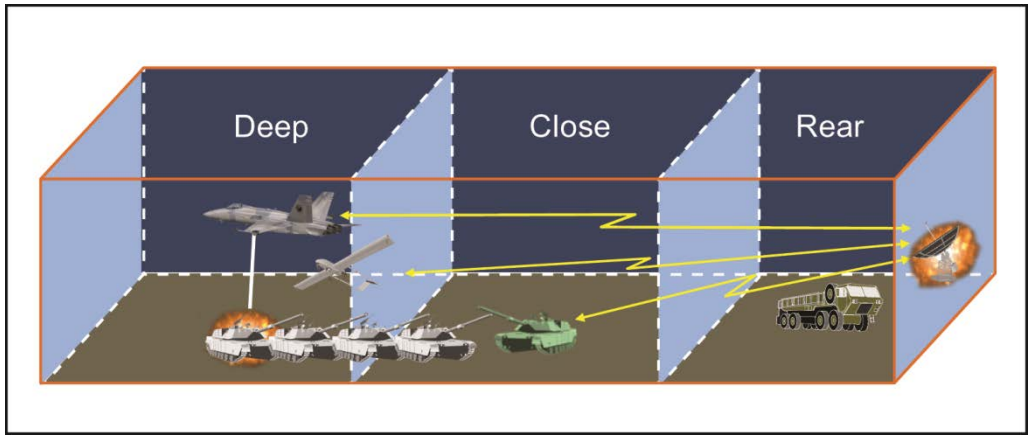
Marine Air-Ground Task Force

employment of a Marine Air Command and Control System (MACCS) to synchronize and provide synergy to airspace control and fires integration for the MAGTF and Joint Force Commander (JFC). Utilizing these preceding three pillars, this essay will prove the thesis the MAGTF commander requires an integrated, three-dimensional battlespace to conduct integrated fires and maneuver. Additionally, this battlespace design may provide solutions to future airspace control and fires integration challenges in the larger joint arena.

…this battlespace design may provide solutions to future airspace control and fires integration challenges in the larger joint arena.

THE MAGTF SINGLE BATTLE CONCEPT

Marines understand decisive actions can occur anywhere on the battlefield, and "actions in one portion of the operational environment can affect actions elsewhere" Marine Corps Doctrinal Publication (MCDP 1-0, pp.3-2). The Marine Corps formalizes this in doctrine as the "single battle concept." The single battle concept synthesizes a commander's perspective on his forces and the operating environment, allowing him or her to view the assigned area and forces as a single, fused entity in relation to time, events, space, or purpose (MCDP 1-0, pp.3-2). Much like the concept of operational art allows Joint Force planners to link tactical tasks to operational and strategic objectives, the single battle concept allows the MAGTF commander to connect the effects of his or her forces to all aspects of the operational environment, enabling him or her to assess all the kinetic and non-kinetic effects of the MAGTF's actions.



The MAGTF Single Battle Concept

The single battle concept provides synergy and amplifies the MAGTF elements (i.e., CE, ACE, GCE, and LCE) into something much greater than the sum of their parts, but requires the MAGTF commander to view the operating environment as much more than just an earthen mound with airspace above it; the MAGTF commander has battlespace.

Marine Corps doctrine defines battlespace as "a way in which the commander views how and where an operation will unfold" Marine Corps Warfighting Publication (MCWP 3-25, pp.17). In this regard, battlespace is cognitive, not assigned. The physical dimensions defining the area on the ground where an operation will occur is known as an area of operations (AO), and Marines view an AO as a two-dimensional space. Marines recognize the airspace above their AO is not automatically theirs to control, and they must request delegation of airspace control from the JFC or his delegated Airspace Control Authority (ACA). In fact, MAGTF planners must coordinate with domain-specific authorities across the Joint Force, requesting authorities to control or manage portions of the JFC's physical and ethereal domains. In the end, the MAGTF's single battlespace includes all aspects of the air, surface, subsurface, space, cyberspace, and electromagnetic spectrum that encompass the MAGTF's AO and area of interest.

MAGTF AVIATION AS A SUPPORTING ARM

Since the single battle concept creates Marines who view MAGTF battlespace as a fused entity where all aspects of the MAGTF's operation contributing physically and ethereally to the operating environment, one can understand Marines view the four components of the MAGTF as a single, integrated body. Specifically, Marines view aviation assets (i.e., fixed and rotary wing, manned and unmanned) as a supporting arm to the MAGTF scheme of maneuver. In fact, Marines codify their aviation integration precept in Joint Publication-1, which states the following:

"The MAGTF commander will retain operational control (OPCON) of organic air assets. The primary mission of the MAGTF Aviation Combat Element is the support of the MAGTF Ground Combat Element. During joint operations, the MAGTF air assets normally will be in support of the MAGTF mission."

(JP-1, Doctrine for the Armed Forces of the United States)

Marine aviation is integrated into the MAGTF scheme of maneuver through the six functions of Marine aviation. The six functions of Marine aviation are air reconnaissance, anti-air warfare, assault support, control of aircraft and missiles, electronic warfare, and offensive air support. Each function provides the MAGTF commander critical, enabling capa-

Marine Corps doctrine defines battlespace as "a way in which the commander views how and where an operation will unfold"…

bilities directly supporting the entire scheme of maneuver, but primarily focusing aviation efforts toward the young riflemen in the GCE.

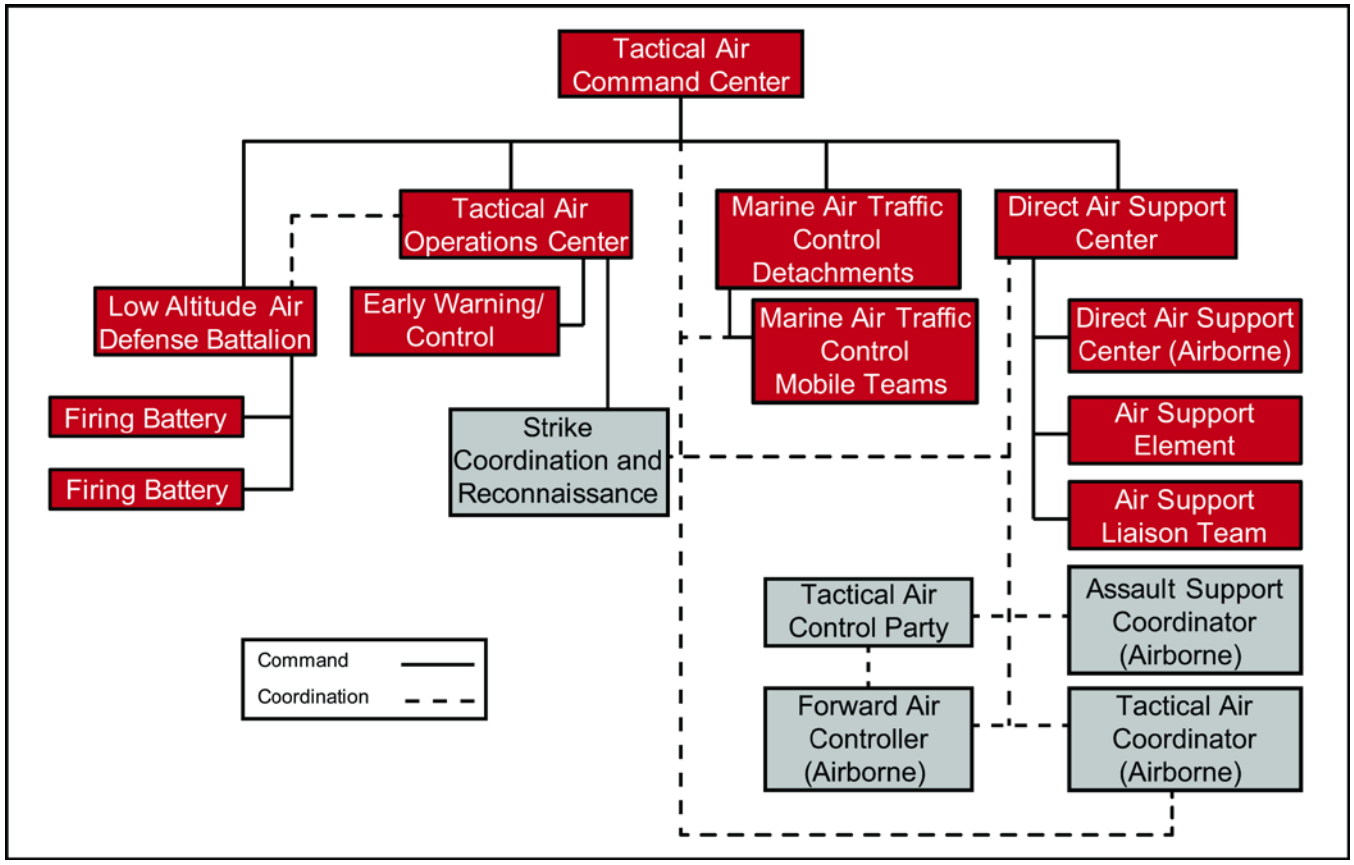
To ensure Marine aviation fluidly traverses the MAGTF battlespace to support operations in the rear, close, and deep areas simultaneously, the MAGTF commander and staff must request delegation of airspace control from the JFC or ACA. The MAGTF staff must ensure its airspace request does not exceed the MAGTF's requirements, because excessive airspace volumes may hinder other joint and coalition operations. However, the key takeaway in the MAGTF's airspace request is, while other Service and functional components request temporal volumes of airspace from the JFC or ACA in the form of airspace control measures, the MAGTF commander requests a large, single volume of airspace above the entire AO, which MAGTF personnel will control 24-hours a day. This is a significant departure from other airspace employment schemes within the Joint Force, but it directly supports the MAGTF's requirements to fight as an integrated, combined-arms team. The MAGTF commander will employ the MACCS throughout the battlespace, providing the ability to integrate aviation as a supporting arm to the scheme of maneuver while concurrently servicing the airspace control needs of the JFC.

INTEGRATING FIRES AND AIRSPACE WITHIN THE MAGTF THROUGH THE MACCS

The MACCS is a network of highly integrated, fundamentally joint aviation command and control (AC2) agencies that integrate the six functions of Marine aviation for the MAGTF Commander. The MACCS is designed to enhance MAGTF operations in all areas of the battlespace, supporting the single battle concept and the requirement to integrate aviation as a supporting arm through habitual relationships between ground and AC2 units. An example of this habitual air-ground relationship exists among the tactical air operations center, tactical air command center, and the MAGTF force fires coordination cell, where coordination and control of the MAGTF deep area occurs in real time, using organic or jointly-sourced aviation and surface fire support assets.

Another example is found in the habitual relationships between the direct air support center (DASC) and the GCE fire support coordination center (FSCC), where ground-based supporting arms, close- and deep-air support, air assault, and other functions are tightly sequenced, coordinated, and controlled to support the GCE's scheme of maneuver. MAGTF air-ground integration extends well below the DASC-FSCC level, frequently extending to subordinate FSCCs through the use of air support elements and air support liaison teams, as well as organic tactical air control parties at every level of GCE. The MACCS ensures aviation's integration with other supporting arms throughout the MAGTF's planning and execution processes, and its unmatched ability to control the MAGTF battlespace may actually enhance the effects of joint air operations for the JFC. The MACCS is comprised of career aviation command and control Marines who have a detailed understanding of the unique relationship between the MAGTF and the ACA when the MAGTF commander is delegated airspace. This understanding allows the MACCS to seamlessly integrate MAGTF-controlled airspace and aviation operations into the joint operations area (JOA), ensuring that MAGTF objectives are met concurrently with JFC objectives.

The MACCS is designed to enhance MAGTF operations in all areas of the battlespace…



Marine Air Command and Control System

As a functional element of the theater air ground system (TAGS), the MACCS provides the MAGTF commander the ability to manage and control large volumes of delegated airspace, well above the coordination level. The MACCS provides the ACA with a high level of situational awareness regarding operations within MAGTF battlespace through doctrinal, habitual relationships with parallel agencies in the TAGS. The habitual relationships between the MACCS and other TAGS elements make the MACCS an inherently joint entity, enabling the MAGTF commander to better serve as a good steward of his delegated airspace to other elements of the joint force. Although the battlespace model may not be appropriate for all Service/functional components, it is clearly a requirement for MAGTF operations, demanding that Marines request the JFC delegates the MACCS airspace control over the MAGTF AO. The MAGTF commander employs the MACCS to integrate Marine aviation and fires assets as supporting arms in his scheme of maneuver, which in turn enables the TAGS to benefit from the MACCS' habitual air-ground relationships and better facilitate the JFC's integration of joint air operations and fires assets.

MACCS provides the MAGTF commander the ability to manage and control large volumes of delegated airspace, well above the coordination level.

FUTURE PERSPECTIVES ON MAGTF BATTLESPACE CONCEPTS

The seemingly infinite number of manned and unmanned aircraft, air-to-surface and surface-to-surface fires that fill the skies over today's joint force present a significant airspace challenge for planners and operators at all levels. Technology has created the ability for nearly every member of the joint force to have some form of aircraft or fire support asset servicing their needs. Creating a restricted operating zone (ROZ) for each requirement leads to, what one British Officer called the airspace in Afghanistan, "the land of 1,000 ROZs."

Though the ROZ approach appears to provide maximum flexibility

for one commander, it can severely restrict adjacent commanders' ability to integrate their fires and aviation assets. Rather than executing airspace operations in a "direct support" capacity for every unique user in the JOA, future airspace planners may choose to employ a "general support airspace" paradigm, rooted in the single battle concept and an airspace control system (ACS) fully integrated with fire support entities and maneuver commanders. Similar to the MAGTF design, this employment concept requires an ACS that understands the objectives of the supported and subordinate commanders so actions in one area of the battlespace have no negative impacts on actions in another area. By focusing joint airspace management away from deconfliction and more toward integration, the TAGS enhances joint fires processes facilitating airspace control and fires integration as a proactive task, rather than creates holes in the sky that others must work around.

…future airspace planners may choose to employ a "general support airspace" paradigm…

Note: Marine Corps Maj Jeremy "BEEF" Winters is the Command, Control and Communications Department Head and Capt Amanda Donnelly is the Direct Air Support Center Division Head at Marine Aviation Weapons and Tactics Squadron One, Yuma, AZ.

US Marines of Detachment Alpha, Marine Air Support Squadron 6, Marine Air Control Group 48 process immediate air support requests within the Direct Air Support Center during exercise Javelin Thrust 20 June 2010, in Hawthorne, Nev. More than 4,500 Marines were participating in the exercise. (Photo by Capt. Keith A. Stevenson, USMC)

CLOSE AIR SUPPORT COMMAND AND CONTROL: THE ASOC PAST, PRESENT, AND FUTURE

Chief Warrant Officer 2 Jose Servic, 82nd Airborne Division, monitors satellite communications during Joint Operational Access Exercise (JOAX) on Fort Bragg, NC 13 February 2011. JOAX is a two-week exercise that includes large package week and joint operational access. The exercise prepares the Air Force and Army to respond to worldwide crisis and contingencies. (Photo by SSgt. Greg C. Biondo, USAF)

By Maj Alexander Heyman

Air power plays many roles in modern conflict, spanning the spectrum from delivery of personnel and material, to collection of intelligence and signals, and employment of various air-delivered munitions. Weapons delivery missions take many forms including deep strike, interdiction, and close air support (CAS). CAS is defined as "air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces." To achieve this, the theater air control system and army air-ground system include many levels of Air Force command and control (C2), ranging from the tactical air control party (TACP) forward with an infantry unit, to the air support operations center (ASOC), and the combined air operations center. This article examines the role of the senior forward Air Force C2 echelon, the ASOC, from the perspectives of the past (linear warfare), present irregular warfare (IW) or counter-insurgency operations (COIN), and future anti-access/area-denial (A2AD), degraded electromagnetic spectrum (EMS).

PAST

The ASOC is aligned with the senior Army command echelon, typically the Corps or the Division. As such, the ASOC employs mobile, self-sustained and contained communications equipment to provide a field-

The ASOC is aligned with the senior Army command echelon, typically the Corps or the Division.

deployable, responsive, and adaptive communications capability. The ASOC is capable of providing for all of its own requirements (other than perimeter security and extended logistics, for which the aligned Army unit takes responsibility) to include secure and non-secure phones, computers, and radios. The ASOC operates the joint air request net for communication of air support requirements and generally two or more air control net frequencies for communication with aircraft. The equipment to provide such communications is mobile and forward deployable, but requires a sizable fleet of vehicles for transport. The weight of the equipment and vehicles is generally kept light with minimal armoring since the ASOC moves to secured areas with the Army Corps or Division Headquarters, when forward.

The conflicts of the past decade have seen the ASOC used in a manner vastly different from previous eras.

In a major linear battle, the ASOC is typically manned with a nine-person crew of officers and enlisted personnel. While the exact makeup of the crew may vary slightly, it generally includes fighter duty officers, fighter duty technicians, TACP-qualified personnel, intelligence specialists, and data link management experts to provide voice and digital communications and C2 for the CAS fight.

Digitally-aided CAS (DaCAS) is an emerging technology that permits transmission of air support requests and taskings via electronic means across a battlefield without the need for two-way voice communication. The ASOC crew pairs resources with requirements, through whatever means are available, while ensuring procedural control of all aircraft in a specific airspace (usually above the coordinating altitude, and geographically defined, as defined in the theater Special Instructions).

The ASOC generally retains Operational level control over the combined force air component commander-apportioned CAS aircraft and allocates them according to the ground commander's priorities and tactical realities. When aligned along a linear front, this process involves the procedural control of aircraft using control points through which aircraft coordinate with their assigned TACP for final control authority. The ASOC provides any area of operations updates to the aircraft when inbound to the battle area and receives in-flight reports from aircraft outbound from the battle area. Ground forces are generally in a movement to contact or actually in contact; and threats to aircraft from enemy forces can include small arms, man-portable air defense systems (MANPADs), or larger caliber (23mm and above) anti-aircraft artillery and surface-to-air missile systems.

PRESENT

The conflicts of the past decade have seen the ASOC used in a manner vastly different from previous eras. While still generally aligned with the senior Ground Command element, the ASOC has been forward deployed in the Iraq and Afghanistan theaters, well within the battle area. The fixed-site nature of the facilities has led to using an established communications and support infrastructure which no longer requires the ASOC to bring forward its own equipment and, therefore, far fewer personnel. This has resulted in a significantly reduced footprint for the ASOC but also created a non-doctrinal dependence on other agencies to provide computers, phones, and (to a lesser extent) radios for ASOC operations. Indeed, ASOC communications personnel who deploy to battlefield locations often are not allowed to work on the ASOC computers since they are not system administrators with the host organization.

In the COIN and IW fights, predominant for more than 10 years, the ASOC has not required a full complement of nine operations personnel. Crew composition has varied from as few as two or three

personnel to as many as six or seven, and the roles and responsibilities have changed substantially. Procedural control has given way to the positive radar control of control and reporting centers with their fixed-site, forward deployed radar systems coupled with implementing "see-and-avoid" and visual flight references procedures. The ASOC's responsibilities have evolved to managing the air tasking order-assigned CAS assets in relation to a much more dynamic ground scheme of maneuver, utilizing the emerging DaCAS tactics, techniques, and procedures (TTPs) which have often been developed in theater and in the combat arena. The sheer size of the battle areas have also required workaround communication solutions that often involve radio relays or transmitting taskings from other agencies.

The nature of COIN and IW has changed many aspects of CAS prioritization. In a linear battle, ground formations generally move to contact and destroy the enemy. Therefore, forces are expected to be "in contact" during the normal course of their maneuvers. In COIN, however, the term "troops in contact (TIC)" has come to mean unexpected or emergent contact with the enemy, often in an ambush or improvised explosive device attack. As such, the relatively limited CAS aircraft are generally prioritized (with few exceptions) to the units involved in TICs, resulting in many pre-planned missions losing their air support due to a higher priority tasking. This has led to a decreased ability of ground forces to reliably plan for CAS as part of a pre-planned operation commensurate with an increased frequency of CAS aircrews spending considerable time mission planning for missions they will never support due to re-tasking.

FUTURE

The future holds many potential challenges for the ASOC as the current conflicts draw to a close, and personnel and resources are made available for whatever is next. These challenges may take several forms, although A2AD and degraded EMS will be particularly challenging for the ASOC. Anti-access generally refers to measures taken by the enemy to deny freedom of movement and operation in the aerial arena. This may include the development and deployment of an integrated air defense system, certain jamming or disruption capabilities, and the use of smaller independent systems such as MANPADs. CAS operations in a contested airspace environment present a significant challenge to the effective delivery of such support. The ASOC must be prepared, in coordination with other organizations, to address concerns such as suppression or destruction of enemy air defenses, standoff weapons employment, retrograde procedures, and combat search and rescue. Although the ASOC may not be the primary controller or coordinator of these additional mission sets, the involvement of CAS assets necessitates ASOC involvement.

In COIN, however, the term "troops in contact (TIC)" has come to mean unexpected or emergent contact with the enemy…

Area denial is another potential threat that refers to actions an enemy may take to prevent friendly forces from basing or operating in a particular region. Threats such as theater ballistic missiles, special operations forces, or cyber warfare may place personnel and equipment, as well as specific operational capabilities, in either physical or functional danger. The ASOC must develop appropriate TTPs to operate in such an environment to include considering appropriate personal protective equipment, hardening or protecting facilities, and making communications capabilities more robust through additional strength or redundancy.

Challenges to the EMS are almost certain to occur in future conflicts. These challenges may include jamming, disruption, or destruction of portions of the EMS or the associated equipment. The ASOC must field systems that are jam-resistant, survivable, and possibly geographically

separated to minimize potential impact from EMS challenges. TACP units and aircraft must likewise employ systems to ensure communications are reliable in such an environment.

"We cannot simply return to the old way of doing things, and we cannot forget the lessons we have learned."

CONCLUSION

The ASOC has established TTPs for fighting major linear warfare, created new means of employment for COIN and IW conflicts, and must look toward adapting further to meet the challenges of the future. However, these challenges are not unique to the ASOC. In a testimony before the Senate Armed Services Committee on 14 Feb 12, the Chairman of the Joint Chiefs of Staff, GEN Martin E. Dempsey, spoke of past lessons, future challenges, and the fiscally constrained and uncertain security environments the nation and its military now face. GEN Dempsey said, "We will have to do all of this in the context of a security environment that is different than the one we faced 10 years ago. We cannot simply return to the old way of doing things, and we cannot forget the lessons we have learned."

End Notes

[1] Joint Publication 3-09.3 change 1, 2 September 2005, page ix.

[2] Memorandum of Agreement for Army/Air Force Liaison Support, dated 31 March 2011, page 4.

[3] Ibid., page 6.

[4] http://www.usatoday.com/news/washington/story/2012-02-14/panetta-defense-budget/53089728/1

Note: Maj Heyman is the Officer in Charge, Operating Location Alpha, 682d Air Support Operations Squadron, Shaw AFB, South Carolina

US Marine Corps 2nd Lt. Jared Cooper, center, radios information while US Air Force Staff Sgt. Cody McNorton, right, and Senior Airman Joseph Flynn, left, watch during Atlantic Strike at Avon Park, Fla., 15 February 2011. Atlantic Strike is a coalition air-to-ground training exercise that simulates a deployed environment. McNorton is joint terminal attack controller assigned to the 14th Air Support Operations Squadron. (Photo by SrA Amber Williams, USAF)

JOINT AIR GROUND INTEGRATION CELL IMPROVES JOINT AIRSPACE CONTROL AND JOINT FIRES INTEGRATION

A CH-47 pilot from Company B, 6-101st Aviation Regiment conducts pre-flight checks prior to a SOF mission in Kandahar Province, Afghanistan, 3 November 2010. (Photo by SGT Richard Carreon, USA)

By Col (Ret) Curtis V. Neal, USAF; COL (Ret) Robert B. Green, USA; and LtCol (Ret) Troy Caraway, USMC

"The joint community and the U.S. Army are not equipped to manage or adequately deconflict airspace of high-traffic density."

GEN Raymond Ordierno, current US Army Chief of Staff

Recent military operations have provided insight into how future operations will increasingly challenge our airspace control abilities. These include large numbers of manned military, civil aviation, other government agency, special operations, and coalition aircraft as well as rapidly expanding numbers of unmanned military aircraft of all sizes. In addition, combat operations demand increasingly large volumes of responsive ground-based fires that have to be integrated into the airspace.

…combat operations demand increasingly large volumes of responsive ground-based fires…

As a result of these challenges, the way the US military controls airspace during Joint operations is fundamentally changing. In 2006, the Army began fielding an organic airspace command and control (AC2) capability comprised of over 1,600 trained operators with dedicated AC2 cells at corps, division, and brigade levels; all linked through the tactical airspace integration system (TAIS).

Unlike most military capability improvements that are based on new systems and technology, other efforts to improve Joint airspace control and Joint fires integration are focusing

on organizational and procedural changes that emphasize proximity and teamwork by co-locating theater air control system personnel with their ground element counterparts executing operations through integrated multi-Service tactics, techniques, and procedures (MTTP).

Recognizing the need for tactical level, combined Joint airspace control and Joint fires integration doctrine, the Services directed the Air Land Sea Application Center to begin development of an MTTP publication designed to help synchronize AC2 and integration of all airspace users within the Joint operations area. The new MTTP will identify multi-Service roles and responsibilities within the airspace and fires planning processes and provide procedural and real- or near real-time tactics, techniques, and procedures (TTP) for airspace deconfliction and integration during execution.

In a related effort, the Air Force and Army have worked to improve Joint airspace control and Joint fires integration at the division level through an organizational concept called the Joint Air Ground Integration Cell (JAGIC).

In a related effort, the Air Force and Army have worked to improve Joint airspace control and Joint fires integration at the division level

The JAGIC is the result of a six-year, Army-Air Force Integration Forum effort, spearheaded by Air Combat Command's Joint Integration Division and the US Army Training and Doctrine Command (TRADOC) Fires Center of Excellence, Joint and Combined Integration Directorate. It has been demonstrated in multiple Army-Air Force warfighting experiments and exercises and resulted in increased air-ground effectiveness during each event.[1]

In 2007 the Army began a migration from a division-centric force toward a more expeditionary brigade-centric force, with the brigade combat team becoming the primary combined arms building-block unit of the Army. Today, the divisions employ brigades to fight battles and engagements while corps conducts large-scale land operations, employing divisions as part of a joint campaign, executing operational-level actions to achieve strategic effects.[2]

To maintain responsiveness and flexibility, the Air Force, in coordination with the Army, decided to increase the number of air support operations centers (ASOCs) from six Cold War-era ASOCs aligned with each Army corps to ten ASOCs, aligned and co-located with the ten active Army divisions.

Each ASOC is responsible for coordination and control of air component missions requiring integration with other supporting arms and ground forces.[3] Three additional ASOCs will remain non-aligned. While still functionally unique, the aligned ASOCs are being integrated with the division tactical air control party (TACP) as part of each division's Air Support Operations Squadron. The ASOC realignment is scheduled to be complete by FY15.

The JAGIC is created by organizing the ASOC operations crew, division TACP personnel, division fires support element, AC2, air and missile defense, and aviation personnel into a single integrated cell within the division current operations integration cell,[4] as shown in figure 1. The JAGIC is simply an integrating cell[5] created from existing Air Force and Army personnel already supporting, or assigned to, the division headquarters. No additional manpower is required to form the JAGIC, and the JAGIC does not replace any current division cells or C2 nodes. Quite simply, the JAGIC improves the way these elements integrate organizationally and procedurally to conduct operations in a more efficient, linked, and situationally aware manner. It builds Soldier-Airman personal relationships, improves communication effectiveness, and increases situational awareness (SA) and understanding.

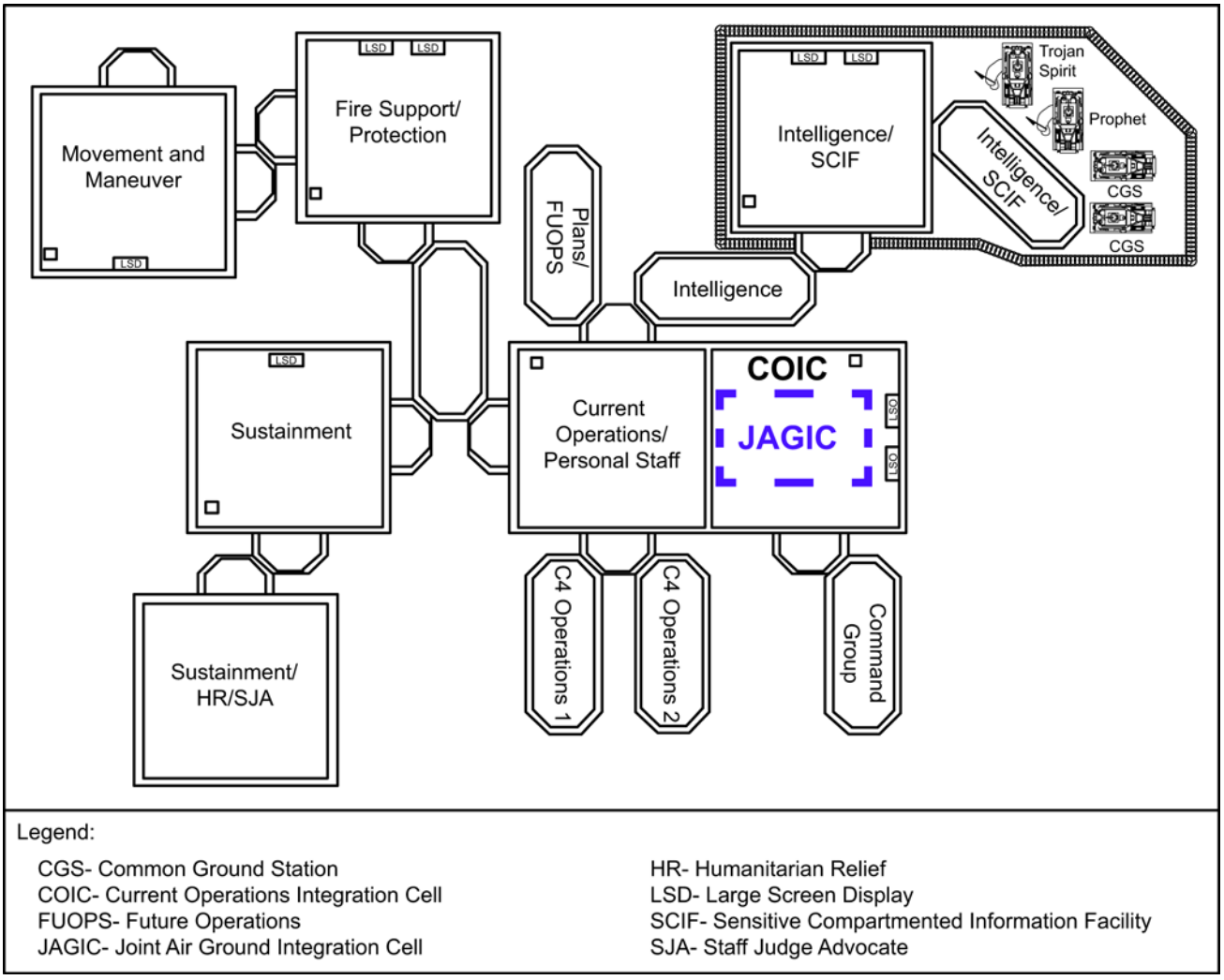


Figure 1. JAGIC Integration in the Division Main Command Post[6]

The JAGIC is neither a staff nor planning cell, but is composed of those personnel directing and monitoring the current fight through the arrangement of operators performing related functions in physical proximity. Such an arrangement not only integrates the air and ground component operators, as shown in figure 2, but also co-locates the decision making authorities from the land and air components with the highest levels of situational awarness (SA) (i.e., the senior air director and deputy fire support coordinator) while building habitual relationships to support the maneuver commander's concept of operations. This arrange-ment also ensures support of the joint force air component commander's objectives and intent and requirements of the joint force commander's designated authorities, such as the airspace control authority and the area air defense commander.

While the overarching function of the JAGIC is to fully integrate Joint airspace control and Joint fires at the division level, it executes integrated TTP to support numerous joint processes including directing and monitoring fires and effects, C2 of some volume of airspace overlying the division area of operations, and rapid attack of emerging targets. Also, it executes interdiction coor-dination, improved friendly force identification, increased SA for air defense and synchronization and integration of tactical intelligence, surveillance, reconnaissance, electronic warfare, information operations, and airlift assets.

…the overarching function of the JAGIC is to fully integrate Joint airspace control and Joint fires at the division level…

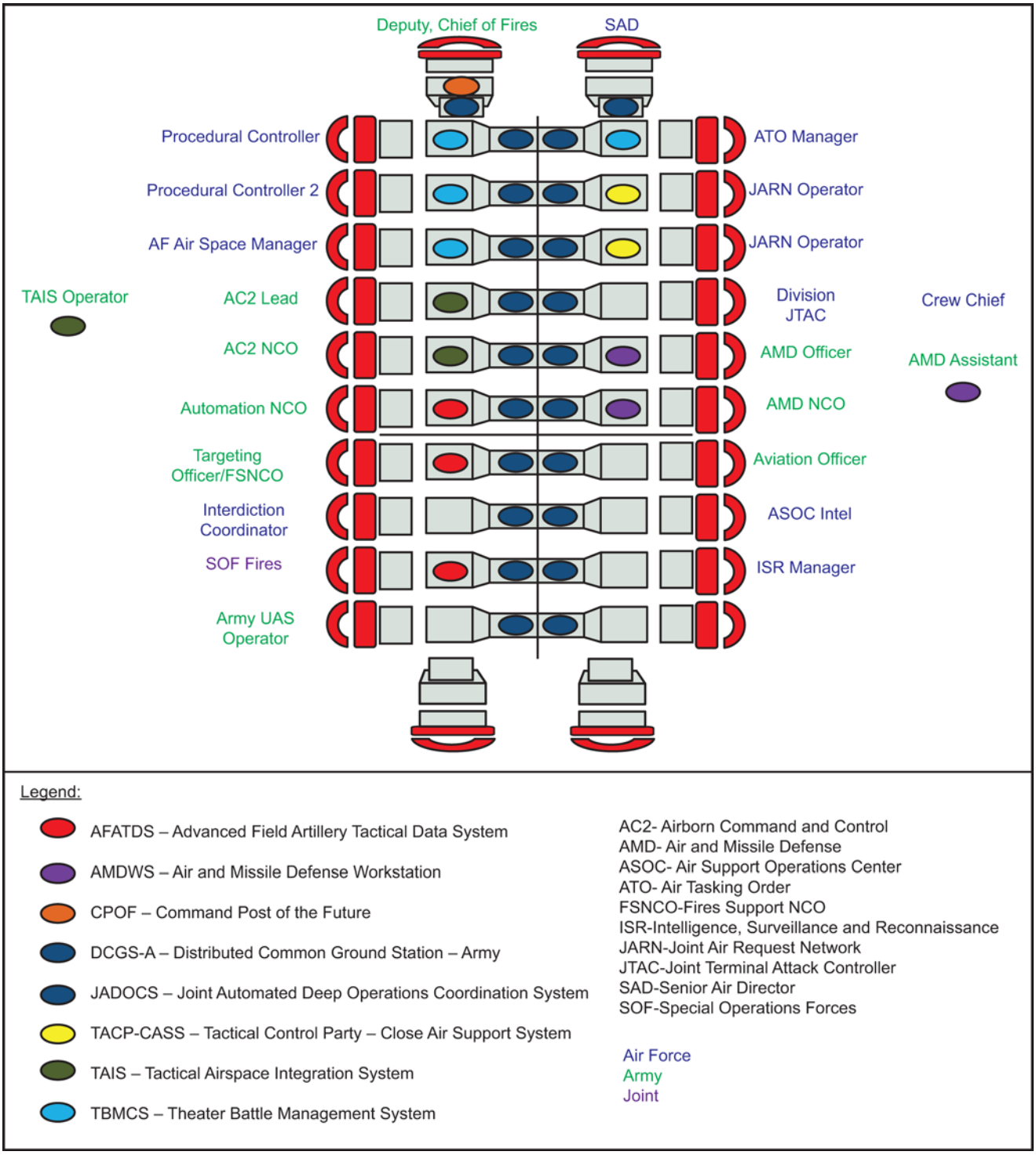


Figure 2. Proposed JAGIC Organizational Layout[7]

The JASE will normally be provided in conjunction with an Army tactical air control team (TAC-T).

The design and manning of the JAGIC is such that a subset of the JAGIC, called a joint air support element (JASE), can be task-organized and sent forward to extend control and integration of air operations in high density aircraft control zones, support displacement operations, or extend support to a subordinate maneuver unit for named operations of limited duration. The JASE will normally be provided in conjunction with an Army tactical air control team (TAC-T). The JASE and TAC-T effectively extend the JAGIC capability forward of the division when needed.

A JAGIC Concept of Employment containing detailed TTP has been developed by the Air Force Command and Control Integration Center, working together with Air

Combat Command's Joint Integration Division and the TRADOC Fires Center of Excellence Joint and Combined Integration Directorate.

Relocation and alignment of ASOCs with 25 Infantry Division (ID) and 1ID are complete and the 82 Airborne Division's ASOC alignment is scheduled to take place in FY12. As the ASOCs relocate to their aligned divisions, Air Combat Command's Joint Integration Division and the TRADOC Fires Center of Excellence Joint and Combined Integration Directorate are providing a joint training team to educate, train and exercise support for JAGIC implementation.

An ongoing revolution in military operations has transformed airspace into the new high ground. All the Services are rapidly fielding new and more dynamic capabilities to exploit this environment. Past practices of deconflicting operations primarily through procedural control methods are proving to be insufficient for current and future operations as uses and users of airspace proliferate and often restrict, rather than enable and enhance, responsive, integrated operations. While new systems and technologies will enhance airspace and fires integration in the future, today the JAGIC is demonstrating a very real capability to improve integration at the division level using existing personnel and systems.

END NOTES

[1] Warfighting experiments include the Fires Battle Lab Earth, Wind, and Fire 08 and 09, AFCIE 10, AGILE Fire I, II and III, Fort Leavenworth Mission Command Battle Lab Joint Forcible Entry Warfighting Experiment and Austere Challenge 11.

[2] FM 3-94 (Initial Draft), Echelons Above Brigade, 28 October 2011, pg 3-2, para 3-1 [sic].

[3] JP 3-09.3, Close Air Support, 8 July 2009.

[4]The current operations integration cell is the integrating cell in the command post with primary responsibility for execution. FM 5-0, The Operations Process, March 2010, para 5-22.

[5] Functional cells are organized by warfighting functions, integrating cells coordinate and synchronize forces and warfighting functions within a specified planning horizon. They include plans, future operations, and current operations integration cells. FM 5-0, The Operations Process, March 2010, para A-24.

[6] The current operations integration cell is located in the division main command post, which is the senior division command and control element responsible for continuous planning of future operations and conduct of current mission.

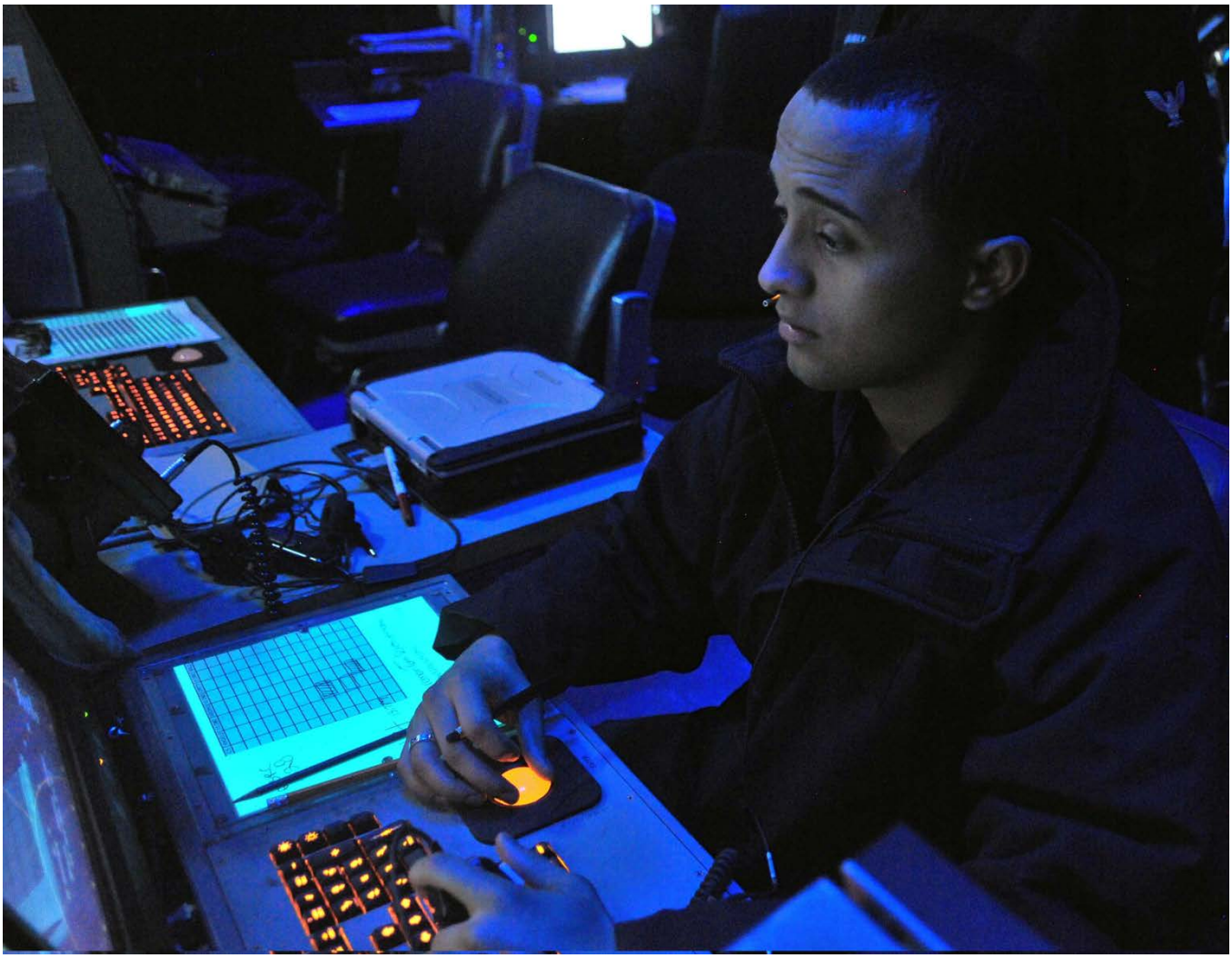
[7] JAGIC concept briefing developed by Air Combat Command's Joint Integration Division (ACC/A3F) and the TRADOC Fires Center of Excellence Joint and Combined Integration (JACI) Directorate, 12 Jan 2012.

An ongoing revolution in military operations has transformed airspace into the new high ground.

Authors Col (Ret) Curtis V. Neal, USAF; COL (Ret) Robert B. Green, USA; and LtCol (Ret) Troy Caraway, USMC, are senior analysts working Joint Air Ground Integration issues for Air Combat Command's Joint Integration Division.

Note: GEN Ordierno's statement was made in 2007 while he served as Commander, Multi-National Corps–Iraq.

AIRSPACE TRANSITIONS FROM JFACC TO CIVILIAN ATC CONTROL



Operations Specialist 2nd Class Marcus Gonzalez stands watch in the Combat Direction Center (CDC) aboard the aircraft carrier USS George Washington (CVN 73) on 30 June 2011. (Photo by MC3 Marcos Vazquez, USN)

By Maj Brian Mansfield, USAF, and Capt James Capra, USAF

Three key questions … are: When…Who… How…?

With the recent conclusion of Operation NEW DAWN (OND) and the future drawdown in Operation ENDURING FREEDOM (OEF), a transition from joint forces air component command (JFACC) owned (as the airspace control authority (ACA)) and tactical command and control (C2) managed wartime use of airspace to a regulated air traffic control (ATC) use of airspace is needed. The transition in OND contained many lessons that can be applied to major combat and low intensity operations where airspace will be returned to the host nation (HN) during the transition to Phase 5 operations.

Three key questions concerning the transition are: When should it start? Who are the major tactical-level players and what will be their roles? And, how should the airspace be transformed for the transition?

This article may be used to begin the discussion by the planning agencies to manage the expectations of senior decision makers from the joint forces commander to the joint forces land component commander (JFLCC) and JFACC, to the executing units of aircraft, ATC and tactical C2.

WHEN

When to normalize airspace operations will be driven by senior-level policies, more than the tactical situation. Political decisions will establish a drawdown timeline, and senior leaders will establish milestones in accordance with their vision. For example, in OEF, the importance of the government providing a viable option to counter insurgent groups requires it establishes a stable income and international trade. Therefore, as important sources of income, the overflight of a country and its ATC structure must increase as the nation seeks to be monetarily stable. In this case, the airspace must continually change in structure and priority of mission sets because the number of civilian aircraft will increase.

As seen in OND, the JFLCC and JFACC must understand an increased risk will be assumed as they reprioritize airspace. The pace of transition can be seen as an important factor due to the additional training and time necessary to safely conduct military operations. In addition, the time required to transit airpower overhead in a conflict will increase during military-to-civilian airspace handover. However, as hostilities increase, the level of military control of the airspace must increase. As hostilities decrease, the JFACC and JFLCC must assume the risk that increased transit times will be necessary to bring airpower to bear, as aircraft are now required to coordinate with an increased number of agencies. (See Joint Publication 3-52, *Joint Airspace Control,* for additional considerations at the operational level and above, on airspace transition to civilian authority.) The JFACC can mitigate this increased risk by reshaping the airspace as discussed later in this article.

Additionally, tactical level planners can assist the pace of handover by identifying warfighter trends and needs and by reducing the number of flights to required minimums for achieving the desired effect. For example, the drawdown of intelligence surveillance and reconnaissance (ISR), fighter, and electronic warfare aircraft was factored into the drawdown in Iraq. This technique included an analysis of the preceding 12 months of joint tactical air requests (JTAR), identified what the actual requirements have been, and established predictable trends for future requests. Ultimately, this created an environment where JTARs could be refined thereby reducing the number of requests by using economy of force and maintaining the same level of effect.

...as important sources of income, the overflight of a country and its ATC structure must increase as the nation seeks to be monetarily stable.

The consolidation of requests is an additional factor to understand when considering airspace handover. As hostilities decrease, the level of shared ISR may increase; and, as the level of civil aircraft increase, the level of military aircraft should decline. This consolidation must be guided by the air support operations center (ASOC). As requests are submitted by individual ground units, the ASOC needs to properly prioritize the requests and potentially package them into geographic, instead of direct, unit support. This packaging should include assets directly communicating with a joint terminal attack controller (JTAC) and assets only collecting ISR in the same geographical area, but not necessarily for the same ground force commander. This will allow quick responses to dynamic situations, such as troops in contact (TICs), and also allows more requests to be met.

As the airspace transition continues, the increase in time to service a JTAR is driven by the constraints of tactical C2 and ATC interaction, as well as their capabilities (e.g., radar and radio capability, HN limitations, procedural requirements, etc.). In addition, ATC operates under procedural control requirements while tactical C2 constraints consist of reduced minimum separations, multiple radar and radio systems fused

together, and mission prioritization. It is important tactical C2 and ATC develop trust and coordination based on capabilities and requirements to allow their synergistic effects to drive down the time between request, movement, and support.

WHO

OND showed, while HN ATC gained a greater role through the transition process, the civilian controllers must still have a basic understanding of military aircraft capabilities so operations would not be degraded unnecessarily. In addition, International Civil Aviation Organization (ICAO) procedures will need to be understood by tactical C2 to include typical ATC verbiage and rules. Even so, the safe transition of airspace requires not only ATC and tactical C2 understanding of roles and responsibilities, but military aircraft understanding of the need and direction of airspace transition.

…International Civil Aviation Organization (ICAO) procedures will need to be understood by tactical C2 to include typical ATC verbiage and rules.

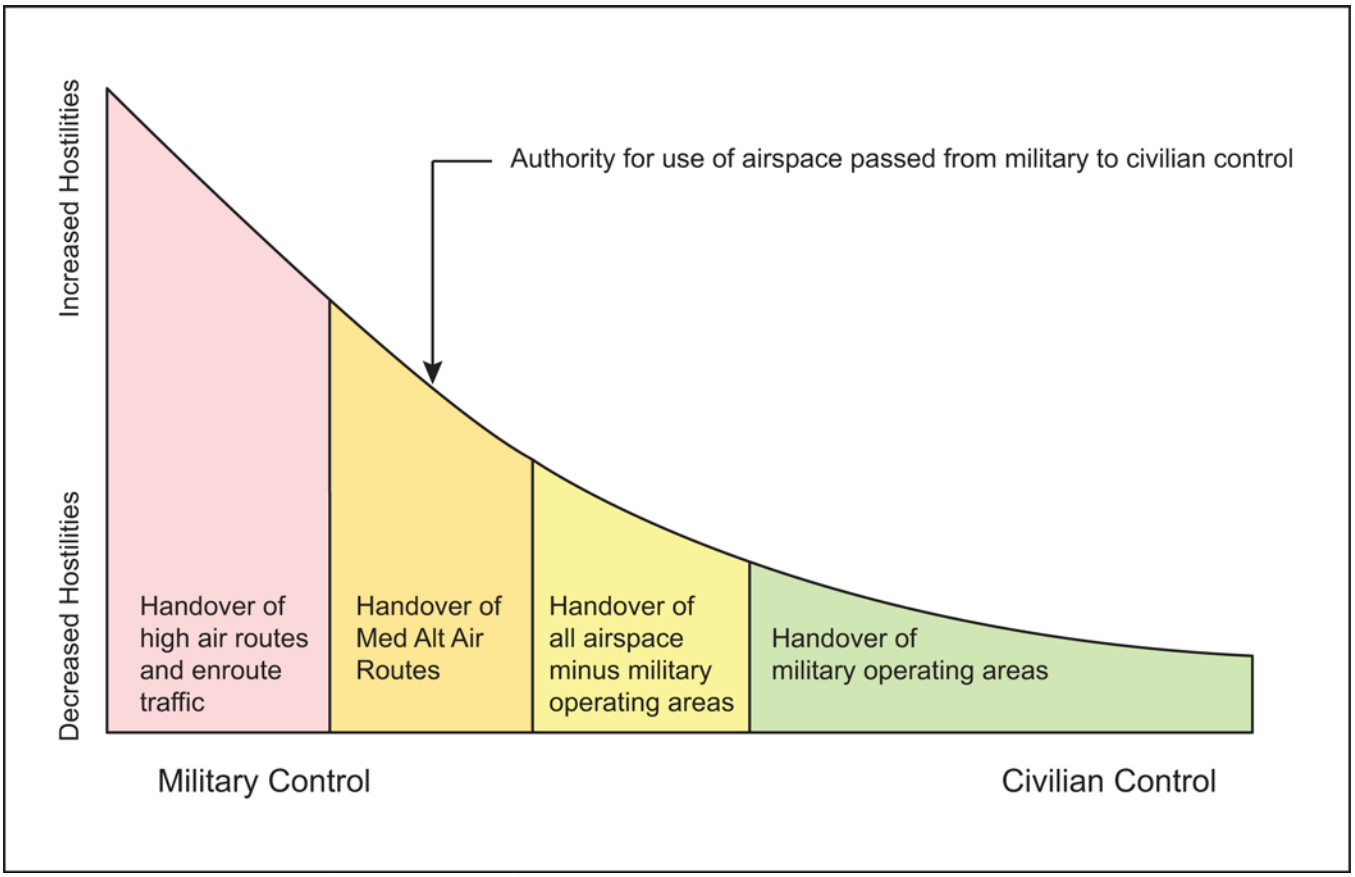
Primary training on airspace transition should focus on fighters, remotely piloted aircraft (RPA), ISR collectors, refueling aircraft, and light, fixed-wing aircraft. This training should focus on ATC's use of the planned routes, altitudes and reference points. This information can be found in the Aeronautical Information Publication published by each country which includes the divisions of the airspace within that country and associated frequencies for the sectors. Aircrews should understand the need to procedurally deconflict aircraft along routes, altitudes, and timing due to limitations in radars within the HN. While aircrew spin-up and initial operations may have included flying directly (not along air routes) to and from taskings, air refueling tracks, and airfields, normalization will require flights along established ATC routes or routings directed by ATC. This will increase transit time and reduce on-station time, but can be mitigated with mission packaging, airspace changes, and ATC's understanding and approval of priority routing (for TICs, known major operations, critical special operations forces (SOF) missions) to increase on station time. This priority routing can be handled by tactical C2 with its reduced separations, experience in operational deconfliction, and merged sensors across multiple ATC sectors.

Tactical C2 can also assist in reduced transit times with en route refueling (also known as "dragging") the responding fighters behind the refueling aircraft to the required location. The key for tactical C2, ATC (military and civilian), and airspace users, is to understand that priority routing, air refueling drags, and "elevators" through traffic routes are now the exception rather than the norm. Every effort should be made to limit these special situations to TICs within a 20-minute response time, SOF operations requiring unplanned support, or a track of interest air-to-air intercept.

HOW

How the airspace should be transformed is just as important as what the primary players' roles are and how they are changed and redefined. This transformation should be based on the host countries' ability to absorb the increasing work load, establish voice communication with the aircrew, and maintain some level of radar contact with them.

In Iraq, this transition was a stair-step approach that went from the higher altitudes and en route traffic beginning in 2007; down to the middle altitudes typically used by military ISR and support aircraft; and, eventually, to a total handover in October 2011. As their capabilities increased, the airspace was transitioned down to lower altitudes and divided into three sectors until all airspace was under civilian control, rather than the JFACC's control as the ACA. Additionally, the Iraqis started taking over tower services and expanded, meeting the stair stepping handover and allowing for a comprehensive civilian ATC service.



Effective Airspace Transition Using Operation New Dawn Lessons

While airspace is under JFACC control, the guidance for user mission prioritization is published in the air operations directive (AOD) and provides the JFACC the means to convey mission priority when competing demands exist. These competing demands will encompass not only fighter type aircraft and manned ISR assets, but also unmanned ISR assets, cargo aircraft (military and civilian), various types of civilian traffic, and the HN aviation capabilities including its own expanding ISR, fighter, helicopter and pilot training needs. The AOD should evolve throughout the airspace transition, raising the priority of first, the HN operations aircraft (i.e., ISR, fighters, or helicopters); second cargo and training aircraft and; third, civilian aircraft.

Reshaping the airspace based on ATC capabilities, in the broad sense sectors, altitudes, and routes are only the first step in normalizing opera-tions. Reshaping the tactical airspace is needed to free the maximum amount of airspace for ATC use while retaining the priority to reclaim needed airspace via AOD priorities. This reshaping of tactical airspace should follow the military operating area (MOA) construct allowing several benefits. First, it leverages a familiarity of aircrews, ATC personnel, and tactical C2 agencies. Second, it allows utilization of airspace for the needs of users while ensuring maximum airspace for ATC movement of traffic by removing kill box operations and tailoring the airspace confines. Third, it allows the HN to request airspace via the same means and names as US forces. This is critical because a common reference system will allow a cross check between control agencies, avoiding unsafe situations. As seen in OND, a kill box system that is not releasable to the HN increases the time and coordination needed to communicate across tactical C2 and ATC agencies.

…reshaping of tactical airspace should follow the military operating area (MOA) construct…

When planning airspace transition, handoff procedures should be standardized between ATC and tactical C2 for entry to and exit from a particular airspace.

When planning airspace transition, handoff procedures should be standardized between ATC and tactical C2 for entry to and exit from a particular airspace. Once in the airspace, tactical C2 will own deconfliction based on priorities and mission requests. Expanding the use of MOAs to include other Theater Air Control System members may allow the altitude management to be handled by either a JTAC or a forward air controller-airborne in a way similar to restricted operating zones. The MOAs can be tailored not only to geographic references or coordinates, but also altitude shaped to allow arrivals and departures into airports, routes between navigation aids, or other restrictions.

In Iraq, prior to the transition, tactical C2 was the release authority for airspace use. When the transition started, ATC released airspace C2 for use. This is a critical step toward airspace normalization but depends upon the nature of the conflict. If the conflict is too tumultuous, ATC agencies will be unable to handle the rapid increase in not only airspace requests, but also changes to those requests. However, if conflict remains constant, the impending workload placed on ATC can be measured and training tailored to it. Subsequently, as seen in OND, at the end of the transition and Phase 5 operations for the US, the Iraqi civil aviation authority was executing the national ATC system. Although a seemingly easy concept, it had far reaching impacts on who was involved and when and how aircraft entered and exited airspace and the coordination required between ATC and tactical C2.

These lessons will help shape and drive conversations for the drawdown of OEF and future operations requiring handing over tactical airspace to a civilian ATC agency.

US Air Force Senior Airman Matthew Jones sits behind his console while ensuring the safe arrival and departure of aircraft landing at Joint Base Balad, Iraq, 24 March 2010. Jones, an air traffic controller, keeps track of aircraft in and around southern Iraq. (Photo by MSgt. Linda C. Miller, USAF.)

CURRENT ALSA MTTP PUBLICATIONS

AIR BRANCH – POC alsaa@langley.af.mil

TITLE	DATE	PUB #	DESCRIPTION / STATUS
AIRSPACE CONTROL *Multi-Service Tactics, Techniques, and Procedures for Airspace Control* **Distribution Restricted**	22 MAY 09	FM 3-52.1 AFTTP 3-2.78	Description: This MTTP publication is a tactical-level document, which helps synchronize and integrate airspace command and control functions and serves as a single-source reference for planners and commanders at all levels. Status: **Assessment**
AVIATION URBAN OPERATIONS *Multi-Service Tactics, Techniques, and Procedures for Aviation Urban Operations* **Distribution Restricted**	9 JUL 05	FM 3-06.1 MCRP 3-35.3A NTTP 3-01.04 AFTTP 3-2.29	Description: This publication provides MTTP for tactical-level planning and execution of fixed- and rotary-wing aviation urban operations. Status: **Revision**
DYNAMIC TARGETING (DT) *Multi-Service Tactics, Techniques, and Procedures for Dynamic Targeting* **Distribution Restricted**	7 May 2012	FM 3-60.1 MCRP 3-16D NTTP 3-60.1 AFTTP 3-2.3	Description: This publication provides the Joint Force Commander, the operational staff, and components MTTP to coordinate, de-conflict, synchronize, and prosecute DTs within any area of responsibility. Includes lessons learned, multinational and other government agency considerations. Status: **Current**
IADS *Multi-Service Tactics, Techniques, and Procedures for an Integrated Air Defense System* **Distribution Restricted**	1 MAY 09	FM 3-01.15 MCRP 3-25E NTTP 3-01.8 AFTTP 3-2.31	Description: This publication provides joint planners with a consolidated reference on Service air defense systems, processes, and structures to include integration procedures. Status: **Current**
JFIRE *Multi-Service Procedures for the Joint Application of Firepower* **Distribution Restricted**	20 DEC 07	FM 3-09.32 MCRP 3-16.6A NTTP 3-09.2 AFTTP 3-2.6	Description: A pocket-sized guide of procedures for calls for fire, CAS, and naval gunfire. Provides tactics for joint operations between attack helicopters and fixed-wing aircraft performing integrated battlefield operations. Status: **Revision**
JSEAD / ARM *Multi-Service Tactics, Techniques, and Procedures for the Suppression of Enemy Air Defenses in a Joint Environment* **Classified SECRET**	28 MAY 04	FM 3-01.4 MCRP 3-22.2A NTTP 3-01.42 AFTTP 3-2.28	Description: This publication contributes to Service interoperability by providing the Joint Task Force and subordinate commanders, their staffs, and SEAD operators a single, consolidated reference. Status: **Revision**
JSTARS (ATCARS) *Multi-Service Tactics, Techniques, and Procedures for the Joint Surveillance Target Attack Radar System* **Distribution Restricted**	16 NOV 06	FM 3-55.6 MCRP 2-24A NTTP 3-55.13 AFTTP 3-2.2	Description: This publication provides procedures for employing JSTARS in dedicated support to the Joint Force Commander. Describes multi-Service TTP for consideration and use during planning and employment of JSTARS. Status: **Revision**
KILL BOX *Multi-Service Tactics, Techniques, and Procedures for Kill Box Employment* **Distribution Restricted**	4 AUG 09	FM 3-09.34 MCRP 3-25H NTTP 3-09.2.1 AFTTP 3-2.59	Description: This publication assists the Services and Joint Force Commanders in developing, establishing, and executing Kill Box procedures to allow rapid target engagement. Describes timely, effective multi-Service solutions to FSCMs, ACMs, and maneuver control measures with respect to Kill Box operations. Status: **Current**
SCAR *Multi-Service Tactics, Techniques, and Procedures for Strike Coordination and Reconnaissance* **Distribution Restricted**	26 NOV 08	FM 3-60.2 MCRP 3-23C NTTP 3-03.4.3 AFTTP 3-2.72	Description: This publication provides strike coordination and reconnaissance (SCAR) MTTP to the military Services for conducting air interdiction against targets of opportunity. Status: **Revision**
SURVIVAL, EVASION, AND RECOVERY *Multi-Service Tactics, Techniques, and Procedures for Survival, Evasion, and Recovery* **Distribution Restricted**	20 MAR 07	FM 3-50.3 NTTP 3-50.3 AFTTP 3-2.26	Description: This publication provides a weather-proof, pocket-sized, quick reference guide of basic survival information to assist Service members in a survival situation regardless of geographic location. Status: **Revision**
TAGS *Multi-Service Tactics, Techniques, and Procedures for the Theater Air-Ground System* **Distribution Restricted/ REL ABCA**	10 APR 07	FM 3-52.2 NTTP 3-56.2 AFTTP 3-2.17	Description: This publication promotes Service awareness regarding the role of airpower in support of the Joint Force Commander's campaign plan, increases understanding of the air-ground system, and provides planning considerations for conducting air-to-ground ops. Status: **Current**

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TITLE	DATE	PUB #	DESCRIPTION / STATUS
UAS *Multi-Service Tactics, Techniques, and Procedures for Tactical Employment of Unmanned Aircraft Systems* **Distribution Restricted**	21 SEP 11	FM 3-04.15 NTTP 3-55.14 AFTTP 3-2.64	Description: Establishes MTTP for UAS addressing tactical and operational considerations; system capabilities; payloads; mission planning; logistics; and, most importantly, multi-Service execution. Status: **Current**

LAND AND SEA BRANCH – POC alsab@langley.af.mil

TITLE	DATE	PUB #	DESCRIPTION / STATUS
ADVISING *Multi-Service Tactics, Techniques, and Procedures for Advising Foreign Forces* Distribution Restricted	10 SEP 09	FM 3-07.10 MCRP 3-33.8A NTTP 3-07.5 AFTTP 3-2.76	Description: This publication serves as a reference to ensure coordinated multi-Service operations for planners and operators preparing for, and conducting, advisor team missions. It is intended to provide units and personnel scheduled to advise foreign forces with viable TTP so they can successfully plan, train for, and carry out their mission. Status: **Current**
AIRFIELD OPENING ***Multi-Service Tactics, Techniques, and Procedures for Airfield Opening*** Distribution Restricted	15 MAY 07	FM 3-17.2 NTTP 3-02.18 AFTTP 3-2.68	Description: This is a quick-reference guide to opening an airfield in accordance with MTTP. It contains planning considerations, airfield layout, and logistical requirements for opening an airfield. Status: **Revision**
CF/SOF *Multi-Service Tactics, Techniques, and Procedures for Conventional Forces and Special Operations Forces Integration and Interoperability* **Distribution Restricted**	17 MAR 10	FM 6-03.05 MCWP 3-36.1 NTTP 3-05.19 AFTTP 3-2.73 USSOCOM Pub 3-33V.3	Description: This publication assists in planning and executing operations where conventional forces and special operations forces (CF/SOF) occupy the same operational environment. Status: **Revision**
CORDON AND SEARCH *Multi-Service Tactics, Techniques, and Procedures for Cordon and Search Operations* **Distribution Restricted**	25 APR 06	FM 3-06.20 MCRP 3-31.4B NTTP 3-05.8 AFTTP 3-2.62	Description: This publication consolidates the Services' best TTP used in cordon and search operations. This publication provides MTTP for planning and executing cordon and search operations at the tactical level of war. Status: **Revision**
EOD *Multi-Service Tactics, Techniques, and Procedures for Explosive Ordnance Disposal in a Joint Environment* **Distribution Restricted**	20 SEP 11	FM 4-30.16 MCRP 3-17.2C NTTP 3-02.5 AFTTP 3-2.32	Description: Provides guidance and procedures for employing a joint EOD force. It assists commanders and planners in understanding the EOD capabilities of each Service. Status: **Current**
Military Diving Operations (MDO) *Multi-Service Tactics, Techniques, and Procedures for Military Diving Operations* **Approved for Public Release**	12 JAN 11	ATTP 3-34.84 MCRP 3-35.9A NTTP 3-07.7 AFTTP 3-2.80 CG COMDTINST 3-07.7	Description: This MTTP publication describes US Military dive mission areas (DMA) as well as the force structure, equipment, and primary missions each Service could provide to a JTF commander. Status**:** **Current**
MILITARY DECEPTION *Multi-Service Tactics, Techniques, and Procedures for Military Deception* Classified SECRET	12 APR 07	MCRP 3-40.4A NTTP 3-58.1 AFTTP 3-2.66	Description: This MTTP facilitates integrating, synchronizing, planning, and executing of MILDEC operations. It serves as a "one stop" reference for service MILDEC planners to plan and execute multi-service MILDEC operations. Status: **Revision**
NLW *Multi-Service Tactics, Techniques, and Procedures for the Tactical Employment of Nonlethal Weapons* **Distribution Restricted**	24 OCT 07	FM 3-22.40 MCWP 3-15.8 NTTP 3-07.3.2 AFTTP 3-2.45	Description: This publication provides a single-source, consolidated reference on the tactical employment of NLWs and offers commanders and their staff guidance for NLW employment and planning. Commanders and staffs can use this publication to aid in the tactical employment of NLW during exercises and contingencies. Status**:** **Revision**
PEACE OPS *Multi-Service Tactics, Techniques, and Procedures for Conducting Peace Operations* **Approved for Public Release**	20 OCT 03 Change 1 incorporated 14 APR 09	FM 3-07.31 MCWP 3-33.8 AFTTP 3-2.40	Description: This publication provides tactical-level guidance to the warfighter for conducting peace operations. Status: **Revision**
TACTICAL CONVOY OPERATIONS *Multi-Service Tactics, Techniques, and Procedures for Tactical Convoy Operations* **Distribution Restricted**	13 JAN 09	FM 4-01.45 MCRP 4-11.3H NTTP 4-01.3 AFTTP 3-2.58	Description: Consolidates the Services' best TTP used in convoy operations into a single multi-Service TTP. It provides a quick reference guide for convoy commanders and subordinates on how to plan, train, and conduct tactical convoy operations in the contemporary operating environment. Status: **Revision**

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TITLE	DATE	PUB #	DESCRIPTION / STATUS
TECHINT *Multi-Service Tactics, Techniques, and Procedures for Technical Intelligence Operations* **Approved for Public Release**	9 JUN 06	FM 2-22.401 NTTP 2-01.4 AFTTP 3-2.63	Description: This publication provides a common set of MTTP for technical intelligence operations. It serves as a reference for Service technical intelligence planners and operators. Status: **Revision**
UXO *Multi-Service Tactics, Techniques, and Procedures for Unexploded Explosive Ordnance Operations* **Distribution Restricted**	20 SEP 11	FM 3-100.38 MCRP 3-17.2B NTTP 3-02.4.1 AFTTP 3-2.12	Description: This MTTP describes hazards of UXO submunitions to land operations, addresses UXO planning considerations, and describes the architecture for reporting and tracking UXO during combat and post conflict. Status: **Current**

COMMAND AND CONTROL (C2) BRANCH - POC: alsac2@langley.af.mil

TITLE	DATE	PUB #	DESCRIPTION / STATUS
AOMSW *Multi-Service Tactics, Techniques, and Procedures for Air Operations in Maritime Surface Warfare* **Distribution Restricted**	17 NOV 08	NTTP 3-20.8 AFTTP 3-2.74	Description: This publication consolidates Service doctrine, TTP, and lessons earned from current operations and exercises to maximize the effectiveness of "air attacks on enemy surface vessels". Status: **Current**
BREVITY *Multi-Service Brevity Codes* **Distribution Restricted**	7 APR 10	FM 1-02.1 MCRP 3-25B NTTP 6-02.1 AFTTP 3-2.5	Description: This publication defines multi-Service brevity which standardizes air-to-air, air-to-surface, surface-to-air, and surface-to-surface brevity code words in multi-Service operations. Status: **Revision**
CIVIL SUPPORT (DSCA) *Multi-Service Tactics, Techniques, and Procedures for Civil Support Operations* **Distribution Restricted**	3 DEC 07	FM 3-28.1 NTTP 3-57.2 AFTTP 3-2.67	Description: The DSCA publication fills the Civil Support Operations MTTP void and assists JTF commanders in organizing and employing Multi-Service Task Force support to civil authorities in response to domestic crisis. Status: **Revision**
COMCAM *Multi-Service Tactics, Techniques, and Procedures for Joint Combat Camera Operations* **Approved for Public Release**	24 MAY 07	FM 3-55.12 MCRP 3-33.7A NTTP 3-13.12 AFTTP 3-2.41	Description: This publication fills the void that exists regarding combat camera doctrine and assists JTF commanders in structuring and employing combat camera assets as an effective operational planning tool. Status: **Revision**
HAVE QUICK *Multi-Service Tactics, Techniques, and Procedures for HAVE QUICK Radios* **Distribution Restricted**	7 MAY 04	FM 6-02.771 MCRP 3-40.3F NTTP 6-02.7 AFTTP 3-2.49	Description: This publication simplifies planning and coordination of HAVE QUICK radio procedures. It provides operators information on multi-Service HAVE QUICK communication systems while conducting home station training or in preparation for interoperability training. Status: **Revision**
HF-ALE *Multi-Service Tactics, Techniques, and Procedures for the High Frequency-Automatic Link Establishment (HF-ALE) Radios* **Distribution Restricted**	20 NOV 07	FM 6-02.74 MCRP 3-40.3E NTTP 6-02.6 AFTTP 3-2.48	Description: This MTTP standardizes high power and low power HF-ALE operations across the Services and enables joint forces to use HF radio as a supplement / alternative to overburdened SATCOM systems for over-the-horizon communications. Status: **Revision**
JATC *Multi-Service Tactics, Techniques, and Procedures for Joint Air Traffic Control* **Distribution Restricted**	23 JUL 09	FM 3-52.3 MCRP 3-25A NTTP 3-56.3 AFTTP 3-2.23	Description: This publication provides guidance on ATC responsibilities, procedures, and employment in a joint environment. It discusses JATC employment and Service relationships for initial, transition, and sustained ATC operations across the spectrum of joint operations within the theater or AOR. Status: **Current**
EW REPROGRAMMING *Multi-Service Tactics, Techniques, and Procedures for the Reprogramming of Electronic Warfare and Target Sensing Systems* **Distribution Restricted**	01 FEB 11	ATTP 3-13.10 MCRP 3-40.5A NTTP 3-51.2 AFTTP 3-2.7	Description: This publication supports the JTF staff in planning, coordinating, and executing reprogramming of electronic warfare and target sensing systems as part of joint force command and control warfare operations. Status: **Current**
TACTICAL CHAT *Multi-Service Tactics, Techniques, and Procedures for Internet Tactical Chat in Support of Operations* **Distribution Restricted**	7 JUL 09	FM 6-02.73 MCRP 3-40.2B NTTP 6-02.8 AFTTP 3-2.77	Description: This publication provides MTTP to standardize and describe the use of internet tactical chat (TC) in support of operations. It provides commanders and their units with guidelines to facilitate coordination and integration of TC when conducting multi-Service and joint force operations. Status: **Current**

COMMAND AND CONTROL (C2) BRANCH - POC: alsac2@langley.af.mil			
TITLE	**DATE**	**PUB #**	**DESCRIPTION / STATUS**
TACTICAL RADIOS *Multi-Service Communications Procedures for Tactical Radios in a Joint Environment* **Approved for Public Release**	14 JUN 02	FM 6-02.72 MCRP 3-40.3A NTTP 6-02.2 AFTTP 3-2.18	Description: This publication standardizes joint operational procedures for SINCGARS and provides an overview of the multi-Service applications of EPLRS. Status: **Revision**
UHF TACSAT/DAMA *Multi- Service Tactics, Techniques, and Procedures Package for Ultra High Frequency Tactical Satellite and Demand Assigned Multiple Access Operations* **Approved for Public Release**	31 AUG 04	FM 6-02.90 MCRP 3-40.3G NTTP 6-02.9 AFTTP 3-2.53	Description: This publication documents TTP that will improve efficiency at the planner and user levels. (Recent operations at the JTF level have demonstrated difficulties in managing a limited number of UHF TACSAT frequencies.) Status: **Revision**

September 2012 Air Land Sea Bulletin (ALSB)

Got a story? Want to tell it? Help us help you!

The Air Land Sea Application (ALSA) Center develops multi-Service tactics, techniques, and procedures (MTTPs) with the goal of meeting the needs of the warfighter. In addition to developing MTTPs, ALSA provides the ALSB forum to facilitate tactical and operationally relevant information exchanges among warfighters of all Services.

There is no better resource for information than the people doing the jobs. Personal experiences, studies and individual research lead to inspirational and educational articles. Therefore, we invite our readers to share their experiences and possibly have them published in an upcoming ALSB. The topic for the September 2012 ALSB is "Attack the Network."

We want to take your lessons learned from Operations IRAQI FREEDOM, ENDURING FREEDOM, NEW DAWN or any other multi-Service missions you have been involved in and spread that knowledge to others. Get published by sharing your experiences and expertise.

With the focus on Attack the Network, what can be done to disable the enemy's networking capabilities and dismantle his strategic and operational ability to attack us? Your article could concentrate on intelligence, biometric database and collection efforts, cyber warfare, information warfare or any expertise over the range of military operations that can be used to achieve these goals. Please keep submissions unclassified and in accordance with the posted advertisement.

Attack the Network

Submissions must:

- Be 1,500 words or less
- Be double spaced
- Be in the MS Word format
- Include the author's name, unit address, telephone numbers, and email address
- Include current, high-resolution, 300 dpi (minimum), original photographs and graphics

Note: Article submissions and photos are due no later than 15 June 2012 for publication in the September 2012 issue.

Early submissions are highly encouraged.

Contact ALSA's Land/Sea Branch at:

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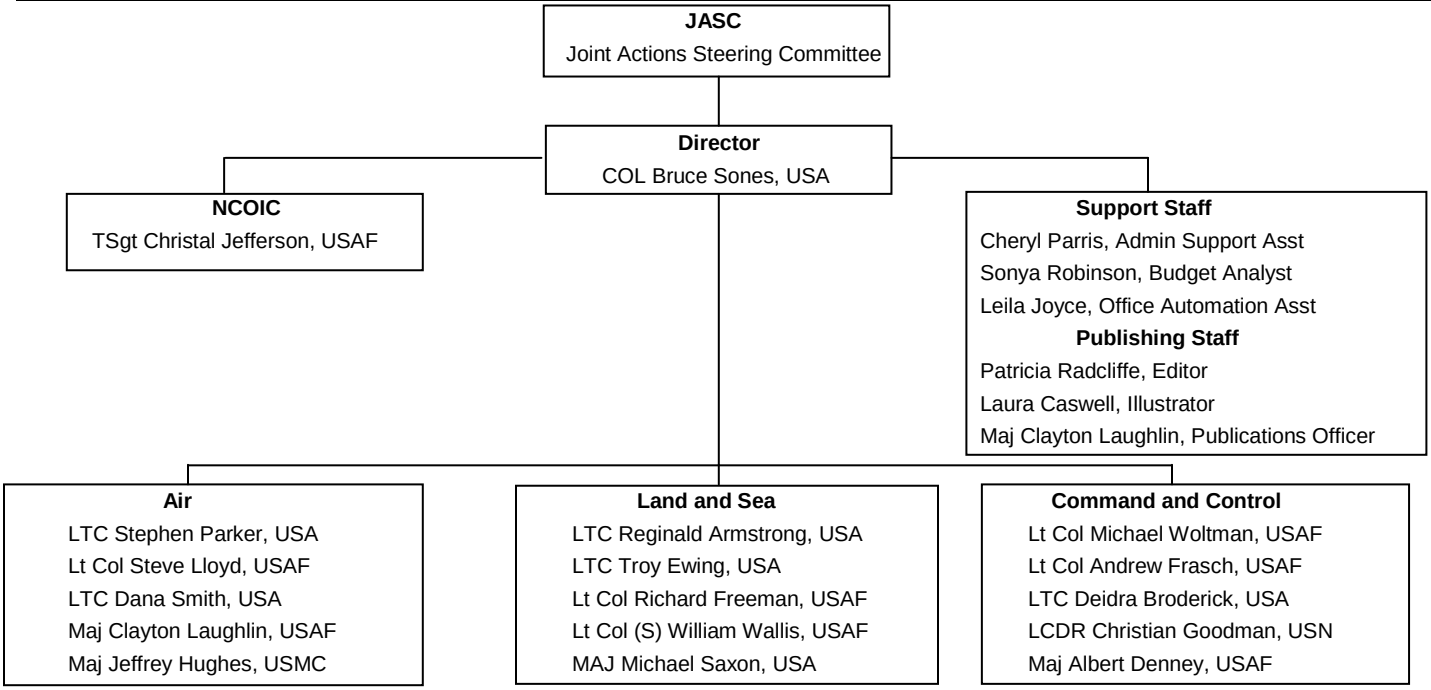

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ALSA's mission is to rapidly and responsively develop multi-Service tactics, techniques and procedures (MTTP), studies, and other like solutions across the entire military spectrum to meet the immediate needs of the warfighter.

ALSA is a joint organization chartered by a memorandum of agreement under the authority of the Commanders of the, US Army Training and Doctrine Command (TRADOC), Marine Corps Combat Development Command (MCCDC), Navy Warfare Development Command (NWDC), and Headquarters, Curtis E. LeMay Center for Doctrine Development and Education. ALSA is governed by a Joint Actions Steering Committee (JASC) consisting of four voting and three nonvoting members.

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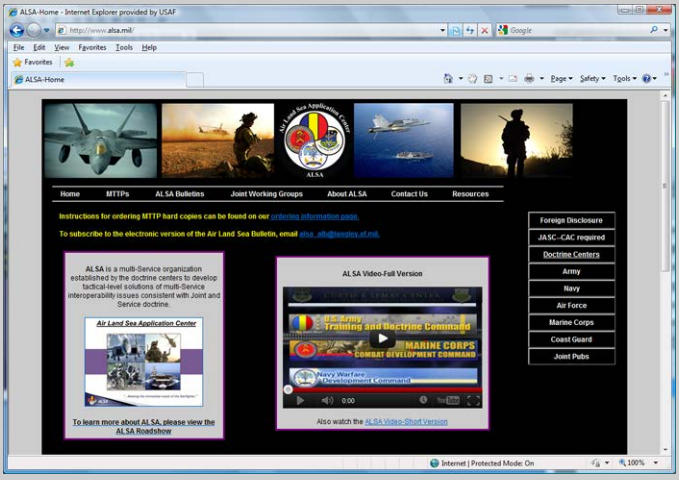

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